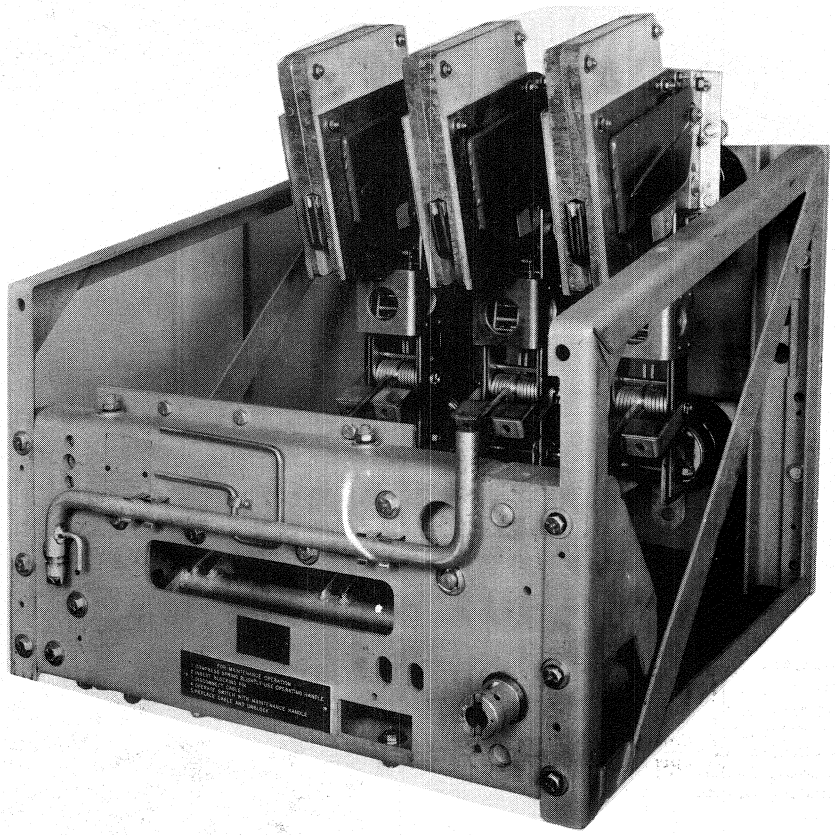
INSTRUCTIONS
AND
RENEWAL PARTS

GEI-77025F
SUPERSEDES GEI-77025E

AUTO-BLAST INTERRUPTER SWITCH

Type SE-9-0
SE-9-1



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HIGH VOLTAGE SWITCHGEAR DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

1. Arc Chute Assembly
2. Blade Assembly
3. Spring Blocking Pin
4. Maintenance Operating Handle
5. Switch Crank Shaft
6. Upper Insulator
7. Lower Insulator
8. Operating Rod
9. Mechanism Assembly
10. Handle Socket

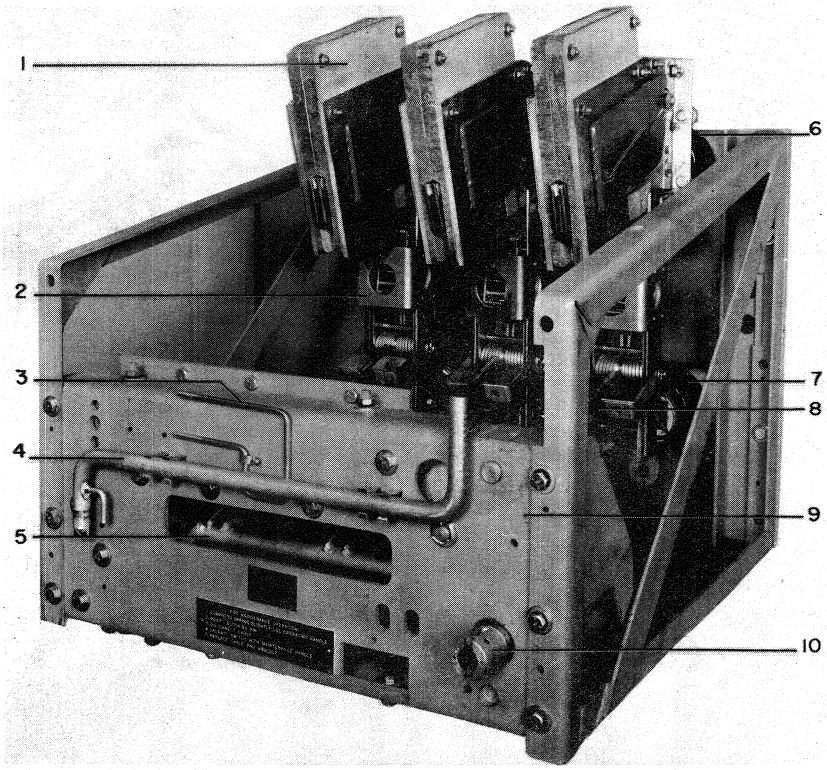


Fig. 1 SE-9 Auto-blast Interrupter Switch

1. Arc Chute Assembly
2. Blade Assembly
3. Operating Rod
4. Operating Spring Housing
5. Mechanism Linkage
6. Opening Dashpot Locking Nuts
7. Opening Dashpot

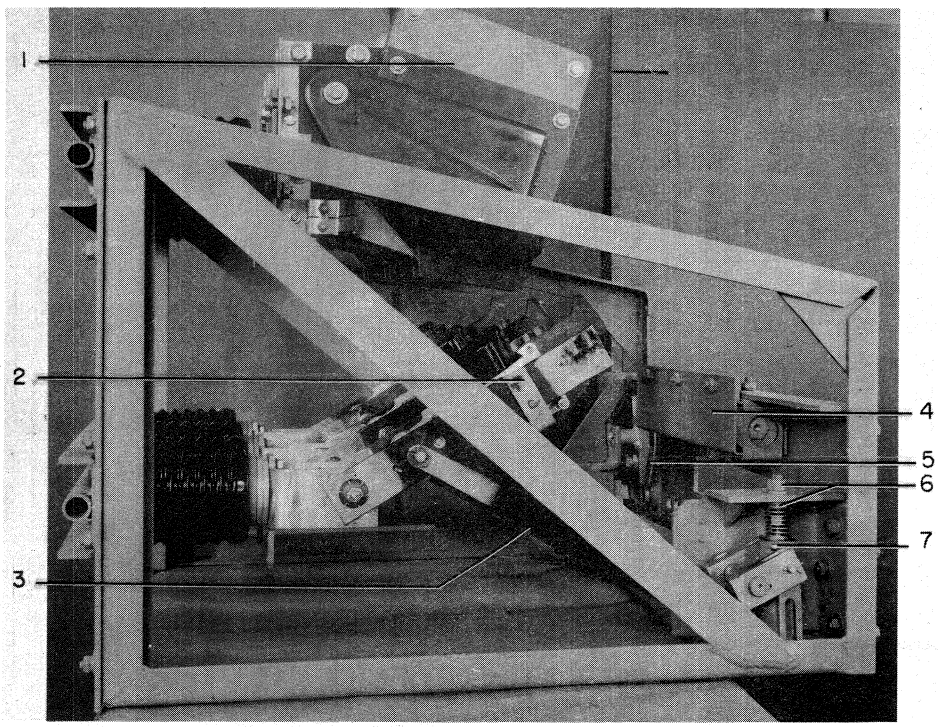


Fig. 2 Side View of SE-9 Auto-Blast Interrupter Switch

Cover (8028081)

Fig. 1 (8028081)

Fig. 2 (8027216)

AUTO-BLAST INTERRUPTER SWITCH
TYPE SE-9

INTRODUCTION

The type SE-9 auto blast interrupter switch is a manually-operated, spring-charged stored-energy triple pole device having a dual function. As well as being a disconnecting switch, the SE-9 has the ability to interrupt transformer magnetizing and load currents within its rating.

The switch is normally furnished with outside and interphase insulating barriers in a metal-enclosed housing for connection either directly to the incoming side of a power transformer, the primary bus or to cables by the use of potheads. When applied with power fuses, the combination serves as a successful switching and fault protection device.

Operation of the switch is manually accomplished by use of a spring-charged type operating mechanism capable of closing and latching the switch contacts against short circuit currents up to its momentary rating. The operating handle is often interlocked with other devices such as secondary circuit breakers in order to assure sequential operation.

The interrupting ability of the switch is accomplished by the use of an arc chute type interrupter working in conjunction with an auxiliary blade, booster cylinder and magnetic blow-out coil. As the switch operates, the arc is forced into the interleaving fins of the arc chute where it is elongated and cooled sufficiently to produce interruption. After the arc had been extinguished, the blade continues to open producing a sufficient air gap to successfully isolate the terminals.

RATINGS

TABLE I

TYPE	NOMINAL VOLTAGE KV	MAXIMUM DESIGN VOLTAGE KV	BIL KV	CONTINUOUS CURRENT AMPS	LOAD BREAK CURRENT AMPS
	2.4	2.75	45		
SE-9-0	4.8	5.5	60	600	600
SE-9-1	7.2	8.25	75	and	
	13.2	14.5	95	1200	

RECEIVING, HANDLING AND STORAGE

RECEIVING AND HANDLING

Immediately upon receipt of the switch, an examination should be made for loss or damage sustained in transit. If injury or rough handling is evident, a damage claim should be filed immediately with the transportation company and the nearest General Electric Apparatus Sales Office should be notified.

Although damage due to handling is minimized because of the metal enclosure, it is expected that due care will be exercised in the unpacking and installation of the switch unit so that no damage will occur from careless or rough handling, or from exposure to moisture or dirt. Care should be exercised to prevent tools from striking any part of the housing or switch itself.

Loose parts associated with the switch are always included in the same crate. Check all parts against the packing list to be sure that no parts have been overlooked.

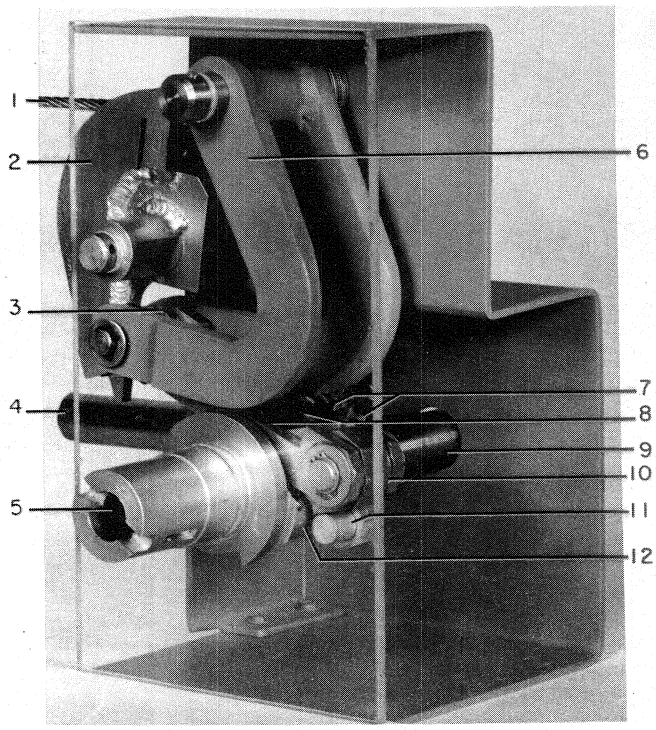
STORAGE

It is recommended that the switch be placed into service immediately in its permanent location. If this is not possible, the following precautions should be taken to insure proper storage conditions:

1. The switch should be stored in a warm dry location to protect the insulation parts from condensation.
2. The switch should be stored in a clean location free from corrosive gases or fumes. Particular care should be taken to protect the equipment from moisture and cement dust, as this combination has a very corrosive effect on many parts.
3. Machined parts of the operating mechanism should be coated with a heavy oil or grease to prevent rusting.

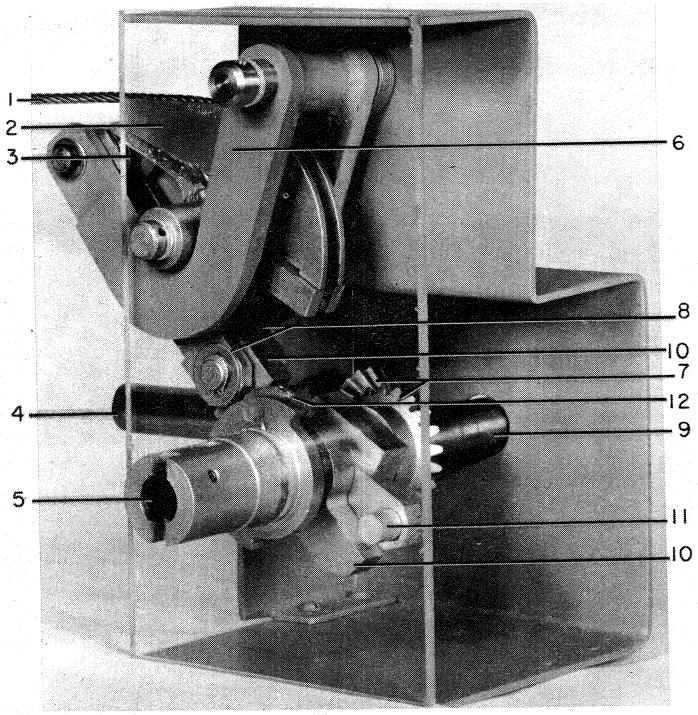
If the switch is stored for long periods of time, periodic inspections should be made to insure that corrosion of metallic parts or deterioration of insulation parts has not begun. Should the switch be stored under unfavorable conditions, steps should be taken to dry out or replace insulation parts before placing in service.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.



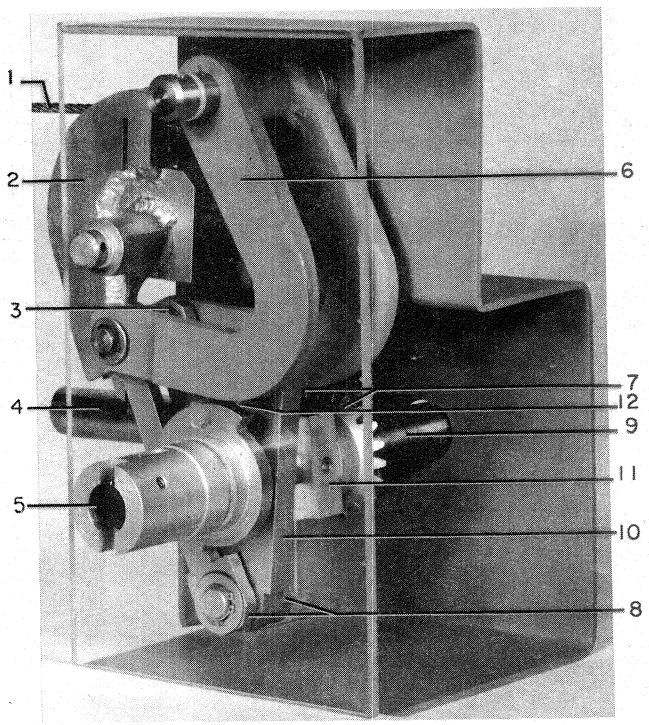
A. Mechanism Uncharged - Switch Open

Fig. 3A (8027402)



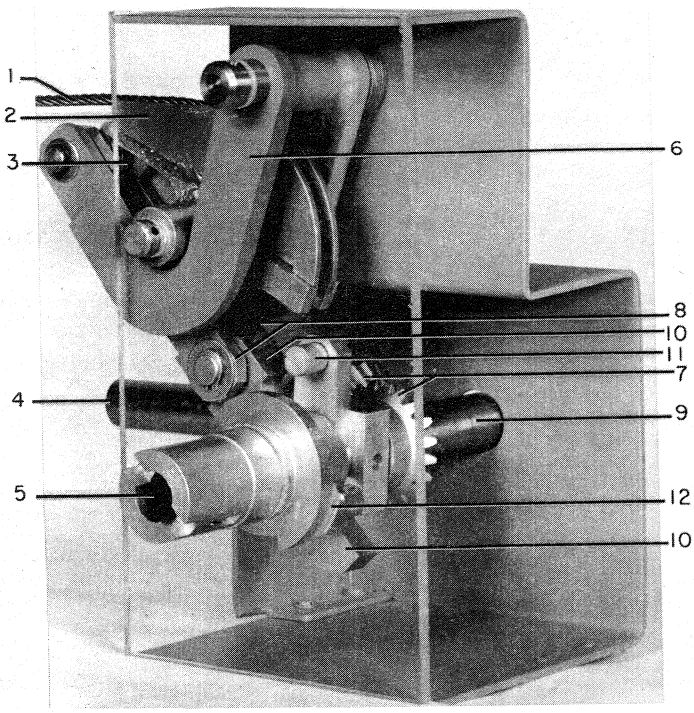
B. Mechanism Charged for Closing - Switch Open

Fig. 3B (8027403)



C. Mechanism Uncharged - Switch Closed

Fig. 3C (8027399)



D. Mechanism Charged for Opening - Switch Closed

Fig. 3D (8027398)

1. Cable
2. Cable Cam
3. Roller
4. Switch Crank Shaft
5. Handle Socket
6. Link
7. Bevel Gears
8. Links
9. Shaft
10. Center Crank
11. Output Crank
12. Hub

Fig. 3 Cutaway View of SE-9 Operating Mechanism

INSTALLATION

MOUNTING

The switch must be mounted in the housing by supporting at both the front and rear. Care should be taken not to distort the frame by mounting on unflat or out-of-square surfaces as twisting may cause misalignment of the contacts. If necessary, shims should be used to prevent twisting.

CONNECTION

Switches are available for connection to the upper terminal from either above or below. Connection of bus bars to this terminal can easily be made using the provided terminal bolts. After connections to the switch have been made, the switch alignment should be checked as listed below.

When furnished as a complete housing, the connections directly to the switch have been made at the factory. On these units, connection is made using the provided potheads, cables, etc.

SWITCH ALIGNMENT

Prior to placing the switch in service the following adjustment and alignment checks should be made to insure proper operation.

1. With the operating springs blocked, (refer to "To Block Operating Springs"), and using the maintenance handle (4), Fig. 1, operate the mechanism and switch slowly to make certain they are moving freely. (Refer to "Closing and Opening Operation".)
2. Arcing contact alignment (refer to page 7).
3. Upper runner adjustment (refer to page 8).
4. Arcing tip wipe (refer to page 8).
5. Primary contact alignment (refer to page 10).
6. Primary contact wipe (refer to page 10).
7. Trip roller clearance (refer to page 10).
8. Opening dashpot adjustments (refer to page 11).

DESCRIPTION OF OPERATION

Both the closing and opening operation of the switch is accomplished by the spring-charged mechanism located on the front of the switch assembly. The mechanism is manually charged but completely disengages the operating handle as it begins to operate the switch. In this way the actual operation of the switch is independent of the operator.

When operating the switch, the handle should be rotated with a positive motion throughout its entire stroke.

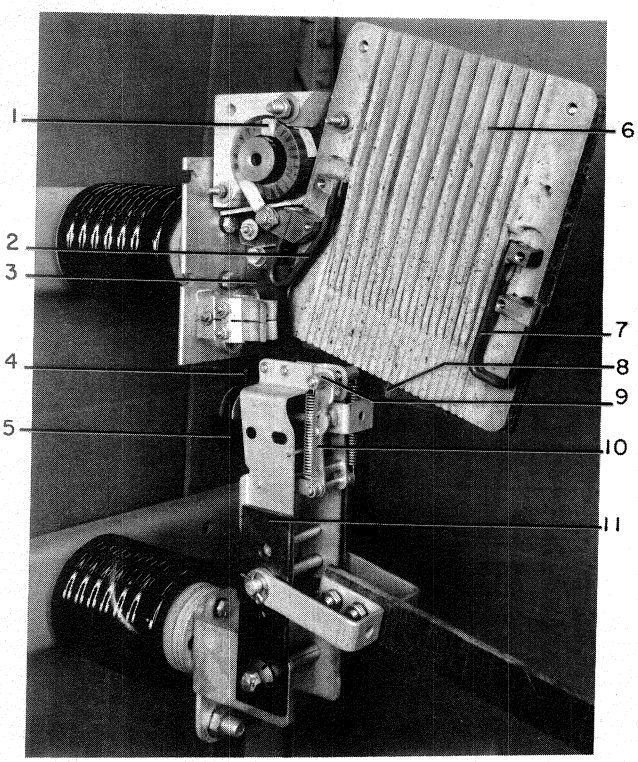
CLOSING OPERATION

Closing of the switch is accomplished by inserting the operating handle into the handle socket (5), Fig. 3A and rotating in a counterclockwise direction as far as possible towards the vertically down position. Referring to Fig. 3A, this action causes the pin in hub (12) to engage the center crank (10), also rotating it in the counterclockwise direction. This motion in turn charges the operating springs through links (8) and (6), cable cam (2) and cable (1).

Shortly before the end of the operating handle stroke, the mechanism linkage reaches a toggle position as shown in Fig. 3B. In this position the springs are fully charged. As rotation of the operating handle continues, the toggle in the mechanism linkage is broken and the energy stored in the operating springs continues to rotate the center crank (10) in the counterclockwise direction. The center crank in turn engages the pin in the output crank (11) also rotating it in the counterclockwise direction. This action closes the switch through the bevel gears (7) and the switch crank shaft (4).

Shortly after the spring begins to rotate the center crank, the operating handle reaches the end of its stroke being positioned for the succeeding opening operation. Fig. 3C shows the mechanism linkage with the switch fully closed. A pair of stops, not illustrated, stop the center crank as well as the switch crank shaft in the correct position. Photo sequence A - B - C of Fig. 3 illustrates the complete closing operation of the mechanism.

It should be pointed out that at any time during the operation prior to the toggle position, the handle can be returned to its initial position, the mechanism linkage returning to its uncharged position as shown in Fig. 3A.



1. Blowout Coil
2. Upper Arc Runner
3. Arcing Tip
4. Nozzle
5. Booster Cylinder
6. Arc Chute
7. Lower Arc Runner
8. Trip Latch
9. Trip Roller
10. Toggle Linkage
11. Primary Blade

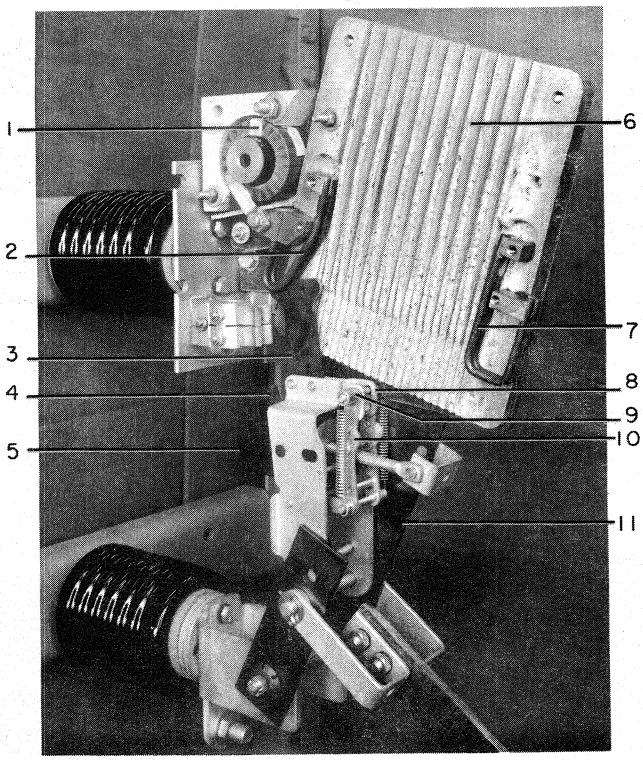
Fig. 4 Cutaway View of SE-9 Switch in Fully Closed Position

Fig. 4 (8027287)

OPENING OPERATION

The operation of the mechanism during an opening operation is the same as that of the closing except hub (12), Fig. 3C and center crank (10) rotate in the clockwise direction. It can be seen in Fig. 3D that the charging of the spring for opening is identical to the charging for closing operation. Photo sequence C - D - A of Fig. 3 illustrates the complete opening operation of the mechanism.

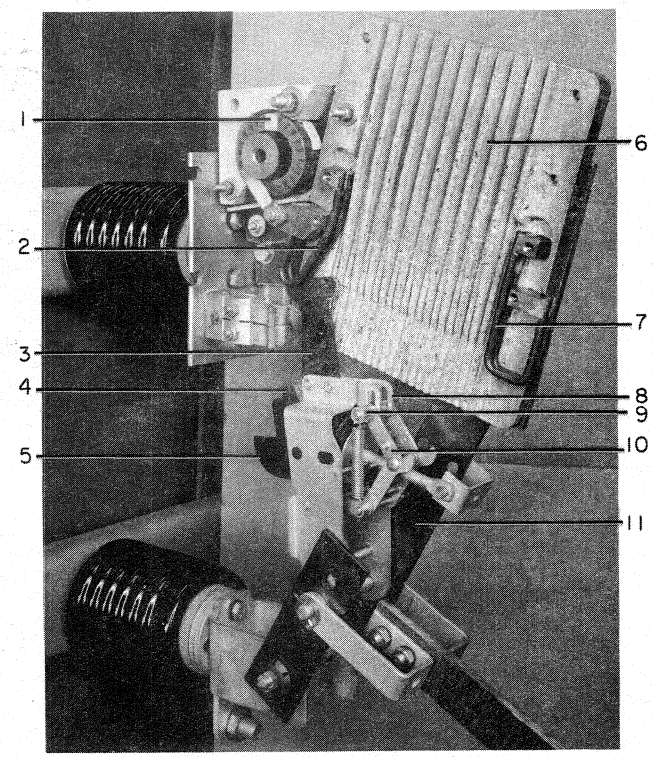
As the mechanism rotates the switch crank shaft, the blade assembly is rotated toward the open position until the roller (9) engages the trip latch (8) as shown in Fig. 5. As the opening operation is continued, the arcing tip (3) on the auxiliary blade remains in contact with the rear arc runner (2) as the primary contacts part. As opening is continued, springs located on each pole are charged by the relative displacement of the auxiliary and primary blade assemblies. At a predetermined position, the latch is released as shown in Fig. 6 and the arcing contacts snap open at a high speed.



1. Blowout Coil
2. Upper Arc Runner
3. Arcing Tip
4. Nozzle
5. Booster Cylinder
6. Arc Chute Side
7. Lower Arc Runner
8. Trip Latch
9. Trip Roller
10. Toggle Linkage
11. Primary Blade

Fig. 5 Cutaway View of SE-9 Switch Shown in Latched Position

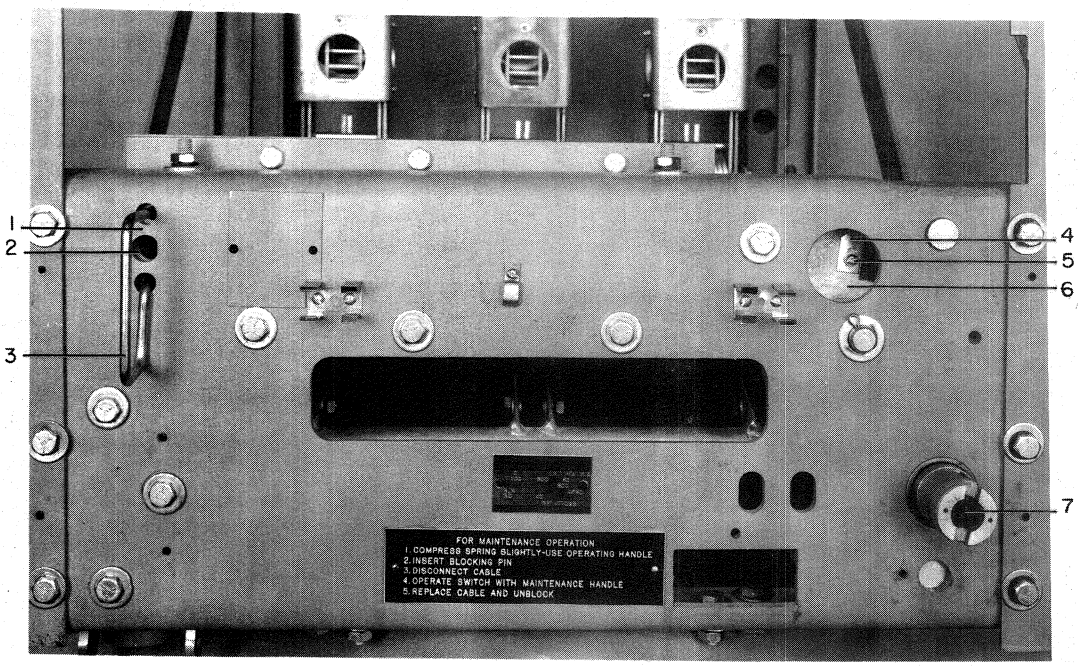
Fig. 5 (8027288)



1. Blowout Coil
2. Rear Arc Runner
3. Arcing Tip
4. Nozzle
5. Booster Cylinder
6. Arc Chute Side
7. Front Arc Runner
8. Trip Latch
9. Trip Roller
10. Toggle Linkage
11. Primary Blade

Fig. 6 Cutaway View of SE-9 Switch Shown in Tripped Position

Fig. 6 (8027289)



1. Operating Spring Housing
2. Hole
3. Spring Blocking Pin
4. Cover Plate
5. Screw
6. Cable Cam
7. Slot

Fig. 7 SE-9 Mechanism with Operating Springs Blocked

Fig. 7 (8028082)

As the arcing contacts part, an arc is established between the arc runners (2) and (7) Fig. 6 within the confines of the arc chute assembly (6). By action of the magnetic blow-out coil (1) and booster cylinder (5) the arc is forced into the interleaving fins of the arc chute where it is elongated and cooled sufficiently to produce interruption.

At the position where the arcing contacts snap open, the opening dashpot (7), Fig. 2, becomes effective greatly reducing the opening speed of the primary blades. This action produces the correct opening speed of the arcing tip while passing through the arc chute as well as providing for the correct rate of air flow from the booster cylinder.

ADJUSTMENTS

Although the switch has been completely adjusted, operated and inspected at the factory, it is possible that unusually rough handling during transportation may have caused some loosening or disturbance of parts of the apparatus. It is therefore advisable to review all adjustments before placing the switch in service, making readjustments wherever necessary.

DO NOT WORK ON OR MAKE ANY ADJUSTMENTS TO THE SWITCH OR MECHANISM UNLESS THE OPERATING SPRINGS HAVE BEEN BLOCKED. (See "To Block Operating Springs"). This measure is required to prevent accidental operation of the switch.

When making adjustments or checking the various clearances, the switch should be operated using the maintenance operating handle. Operation of the switch using the spring-charged mechanism should not be attempted until the blades have been operated through their entire stroke several times and final inspection is complete.

All adjustments should be checked during periodic inspections and whenever repair or replacement of parts becomes necessary. The adjustments are listed in the order in which they should be checked.

TO BLOCK OPERATING SPRINGS

Blocking of the operating springs is accomplished by removing the cable (1) Fig. 3, from the mechanism linkage. To do this, place the switch in the open position, partially charge the springs with the operating handle until the spring blocking pin (3) Fig. 7, can be inserted as shown. DO NOT CONTINUE TO ROTATE THE HANDLE PAST THIS POSITION, AS IT WOULD ALLOW THE SPRING TO DISCHARGE, CLOSING THE SWITCH. The position of the springs where the spring blocking pin can be inserted can easily be determined by watching the spring assembly through the hole (2) Fig. 7 in the spring housing (1). THE SPRING BLOCKING PIN MUST EXTEND THROUGH BOTH SIDES OF THE SPRING HOUSING.

After inserting the spring blocking pin, loosen the screw (5) Fig. 7 on the front surface of the cable cam (6), raise the small cover plate (4) covering the end of the cable allowing it to rotate towards the right. The cable can now be removed from the cable cam. Replace the cover plate and tighten screw before attempting manual operation of the switch.

To reconnect the cable and remove the spring blocking pin, the mechanism linkage must be in the same position as when the cable was removed. This can be done by manually opening the switch and then rotating the mechanism linkage fully in the clockwise direction using the operating handle. MAKE CERTAIN THAT THE COVER PLATE IS CORRECTLY POSITIONED OVER THE END OF THE CABLE AND TIGHTENED. (As shown in Fig. 7)

OPERATION OF THE SWITCH WITH THE SPRINGS BLOCKED

Before manually operating, disconnect the springs as previously described. Using the maintenance operating handle (4), Fig. 1, insert the "key" end into slot (7), Fig. 7 located in the center of the handle socket hub. The switch can now be operated by rotating the handle. DO NOT ATTEMPT TO MANUALLY OPERATE THE SWITCH WHEN IN SERVICE.

ARCING CONTACT ALIGNMENT

Open and close the switch slowly and observe the arcing tip (3) Fig. 4, as it enters the arc chute (6). The arcing tip

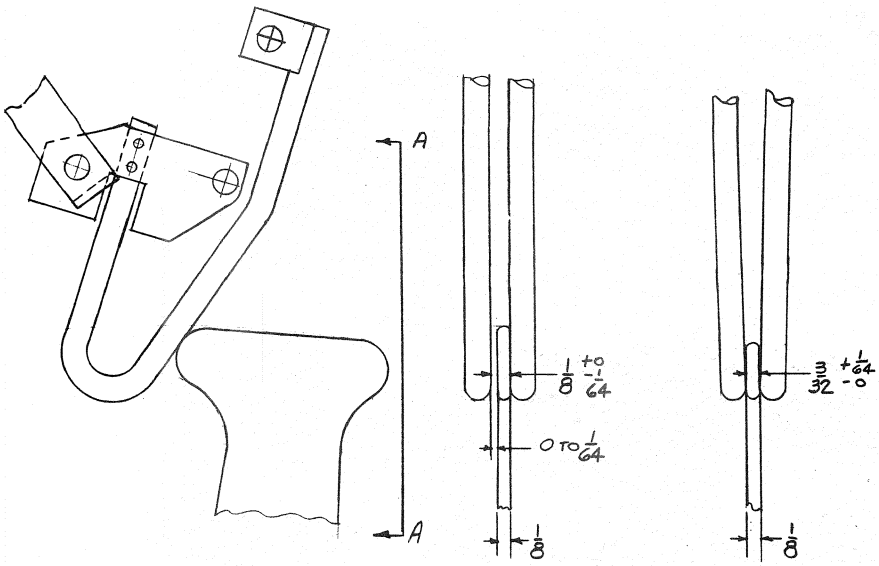


Fig. 8 Runner and Arc Tip Relation

should pass completely through the lower arc runner (7) without touching and be centrally located as it enters the upper runner (2) and it should make contact with it. If the arcing tip is not centered, loosen the arc chute mounting bolts (6) or (7) Fig. 14 and shift the arc chute in the proper direction. Tighten the mounting bolts and recheck alignment.

NOTE: Shifting the arc chute may change the trip roller clearance.

UPPER RUNNER ADJUSTMENT
(Refer to Fig. 8)

TYPE SE-9-0 DESIGN

The opening in the upper runner, Fig. 8 should measure 1/8" + 0" - 1/64".

TYPE SE-9-1 DESIGN

The opening in the upper runner, Fig. 8 should measure 3/32" + 1/64" - 0". The runner opening of both the -0 and -1 designs can be measured by using an extended set of feeler gages. If the opening is too wide, use a pair of sharp nosed pliers (1) to pinch the runners toghether, as shown in Fig. 9. If the opening is too narrow, use a screw driver to pry the runner apart as shown in Fig. 10. Under no circumstances should the side of the arc chute be used as a pry, for the material is brittle and may tend to crack.

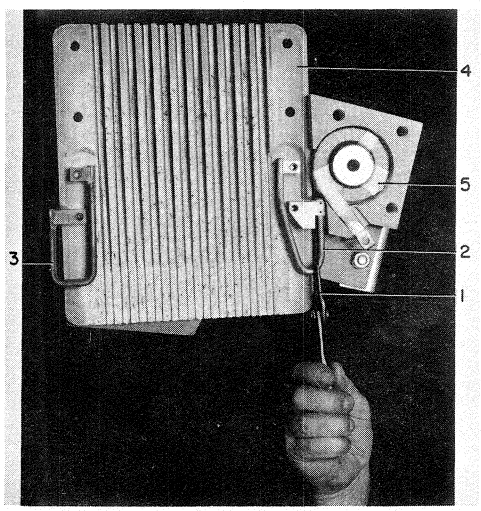
ARCING TIP WIPE

When the switch has been positioned with the trip rollers in the latched position as shown in Fig. 5, (the primary contacts and blade are not made), there should be electrical contact between the arcing tip (3), Fig. 5, and the upper arc runner, (2), Fig. 5. This can be determined by checking the circuit with a light indicator, bell set or continuity tester, as shown in Fig. 11.

TYPE SE-9-0 DESIGN

The wipe of the tip should be 1/64" maximum. To measure this a tie-in should be made with the upper runner adjustment. If the runner opening measures 1/8", the wipe checking dimension should measure 1/64", Fig. 8. If the runner opening measures 7/64", the wipe checking dimension should measure zero, Fig. 8. In both

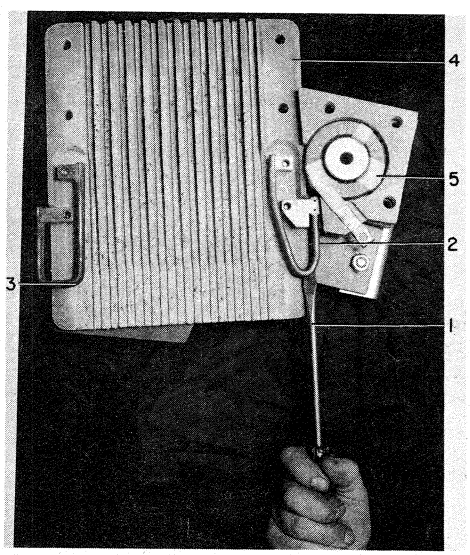
Fig. 8 (1078395)



1. Sharp-nose Pliers
2. Upper Arc Runner
3. Lower Arc Runner
4. Arc Chute Side
5. Blowout Coil

Fig. 9 Auto-Blast Switch Device Interrupter Assembly

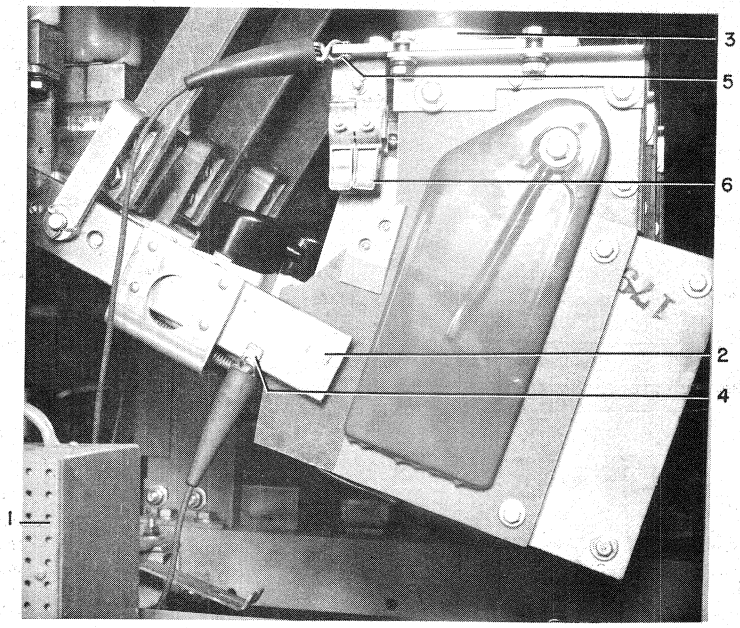
Fig. 9 (8030548)



1. Screw Driver
2. Upper Arc Runner
3. Lower Arc Runner
4. Arc Chute Side
5. Blowout Coil

Fig. 10 Auto-Blast Switch Device Interrupter Assembly

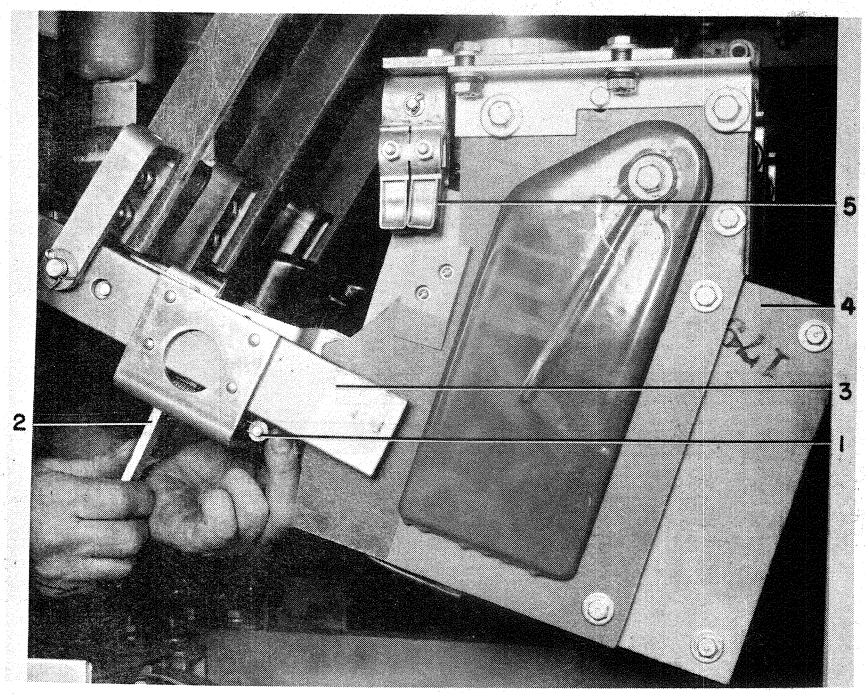
Fig. 10 (8030547)



1. Bell Set
2. Primary Blade
3. Upper Contact
4. Bell Set Lead
5. Bell Set Lead
6. Primary Contact

Fig. 11 (8030551)

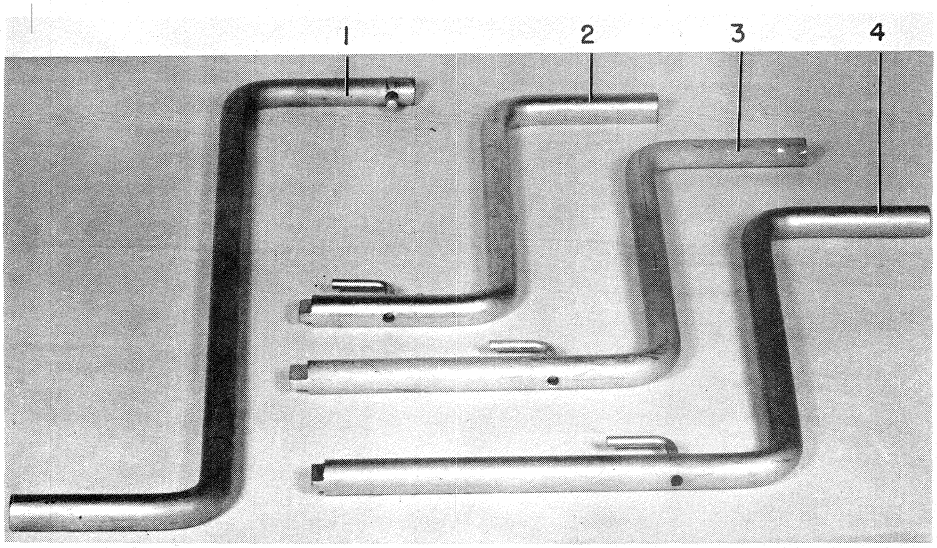
Fig. 11 Side View Auto-Blast Switch R/O Assembly



1. Toggle Roller
2. 1/8" Thick Retainer
3. Primary Blade
4. Arc Chute Assembly
5. Primary Fingers

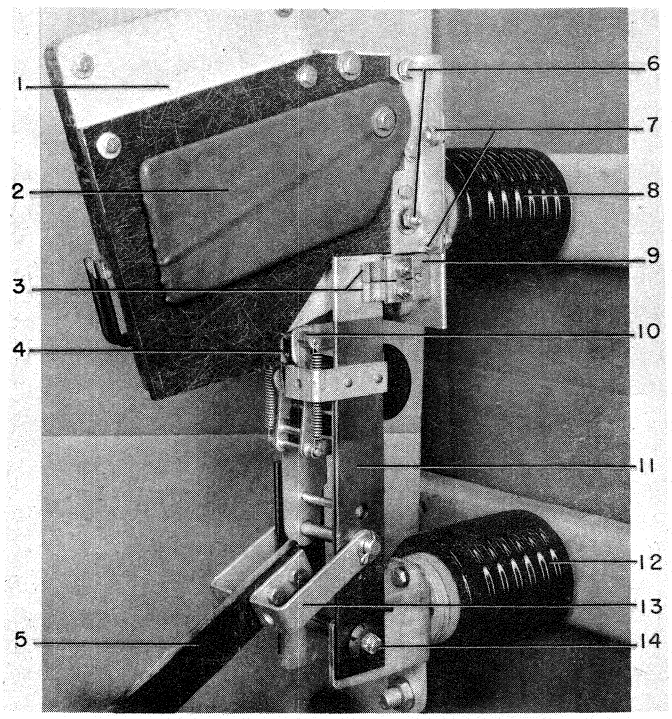
Fig. 12 (8030550)

Fig. 12 Side View Auto-Blast Switch R/O Assembly



1. Operating Handle
2. Maintenance Handle
3. Maintenance Handle
4. Maintenance Handle

Fig. 13 Handles



1. Arc Chute Assembly
2. Pole Piece
3. Primary Fingers
4. Trip Latch
5. Operating Rod
6. Assembly Bolts
7. Arc Chute Mounting Bolts
8. Upper Insulator
9. Finger Support
10. Roller
11. Primary Blade
12. Lower Insulator
13. Yokes
14. Hinge Stud

Fig. 14 Complete Pole Assembly of the SE-9 Switch

cases the arcing tip will have 1/64" wipe on the runner side that it is wiping. To check this, block the closing springs (see "To Block Operating Springs), depress the toggle rollers and insert a 1/8" thick retainer (6) on each pole as shown in Fig. 12. Using the maintenance handle Fig. 13, close the switch until the arcing tip (3), Fig. 5 makes electrical contact with upper arc runner (2), Fig. 5. Then measure the arcing tip wipe.

Fig. 13 (8030608)

TYPE SE-9-1 DESIGN

The arcing tip should wipe on both sides of the upper runner. When it is adjusted in this manner, the wipe will vary from 1/64" minimum when the upper runner is set at 7/64", to 1/32" maximum when the upper runner is set at 3/32".

PRIMARY CONTACT ALIGNMENT

Open and close the switch slowly and observe the position of the primary blades (11), Fig. 14, on each pole as they enter the primary contact fingers (3). The blade should be centrally located within the fingers. To adjust for this, loosen the mounting bolts for either the upper (8) or lower insulator (12) and shift the insulator laterally until correct alignment is obtained. Tighten the mounting bolts and recheck for correct alignment.

PRIMARY CONTACT BEARING

Check that each primary contact finger (3), Fig. 14, is making contact with the primary blade (11) when in the closed position. This can be checked using a .002" feeler gage or a thin film of grease. In the closed position, each finger should be pulled away from the forward edge of the finger support (9). To adjust, loosen the upper insulator (8), Fig. 14, mounting bolts and rotate the insulator assembly slightly in the proper direction. Tighten the mounting bolts and recheck for correct bearing.

Fig. 14 (8027286)

PRIMARY CONTACT WIPE

When the switch is closed slowly by hand the clearance between the edge of the primary blade (11), Fig. 14, and the front edge of the finger support (9) should be 3/32" - 1/4". Adjustment can be made by shifting the bolted connection between the operating rods (5), Fig. 14, and yokes (13).

TRIP ROLLER CLEARANCE

With the switch in the open position, depress the toggle linkage (10), Fig. 4, as far as possible and slowly close the switch until the roller (9) is directly under the trip latches (8) on the arc chute similar to that shown in Fig. 6. In this position there should be a minimum clearance of 3/32" between the latch and the roller. This can be varied by loosening the arc chute mounting bolts (7), Fig. 14 and sliding the arc chute assembly in the proper direction.

TRIP ROLLER BEARING

Open the blades slowly until the auxiliary blade is in the latched position as shown in Fig. 5. In this position there should be a minimum of 3/16" engagement between the latch (8) and roller (9). Also check that all three poles of the switch trip

at the same time. This can be checked by opening the blades very slowly until the auxiliary blades snap. The trip roller bearing can be varied by loosening the arc chute mounting bolts (7), Fig. 14 and sliding the arc chute in the proper direction. The timing can be varied by loosening the assembly bolts (6) on the arc chute and shifting the assembly with respect to the mounting flanges.

NOTE: These changes may affect the arcing contact alignment and trip roller clearance.

BOOSTER CYLINDER PRESSURE

The pressure in the booster cylinder (5), Fig. 4 can be checked by first opening the switch and raising the auxiliary blade to its highest position relative to the primary blade. With the switch in this position, place a finger over the nozzle (4) and release the auxiliary blade assembly. Under this condition the auxiliary blade should remain stationary or move slowly toward its normal position. If the return is rapid the piston is worn and should be replaced.

PRIMARY FINGER PRESSURE

The primary fingers have the correct pressure when the finger retainer bolts have between 1-1/2 to 2 threads showing beyond the head of the nut.

PRIMARY BLADE HINGE PRESSURE

The pressure at the hinge of the primary blade can be checked by measuring the torque required to rotate the blade assembly. With the blade in a position as to be closed as far as possible without engaging the primary fingers, measure the torque required to rotate the blade towards the open position. The torque should measure 15 to 20 inch-pounds.

NOTE: In order to measure this torque it is first necessary to disconnect the operating rod from the switch crank shaft. Adjustment can be made by loosening or tightening the nuts on the hinge stud (14), Fig. 14.

OPENING DASHPOT
(Refer to Fig. 15)

OPENING DASHPOT PICK-UP

Open the switch very slowly and measure the travel of the opening dashpot, before the arcing blades trip. This travel should be 1/32" - 1/16". The travel can be increased by loosening the lock nuts (1) and lowering the entire dashpot assembly.

Also check that air is not present in the dashpot. This can be done with the switch in the closed position by rapidly pulling up on the dashpot cylinder. If air is present, the cylinder will move very easily until the oil reaches the piston. If air is present the cylinder must be removed and additional oil added.

NOTE: When adding oil, set the level at 2-1/8" - 2-1/4" from the inside bottom of the cylinder. Use Silicon Oil SF96(50).

OPENING DASHPOT OVERTRAVEL

With the switch in the fully open position, check the overtravel of the dashpot by lifting the cylinder. This travel should be 1/16" minimum. The relationship between the pick-up and overtravel of the opening dashpot is set at the factory and no adjustment is necessary. If insufficient overtravel is present, check for proper pickup or binds in the cylinder assembly.

OPENING DASHPOT RESET

With the switch in the closed position, lift the dashpot cylinder to its full extent and check the time for it to reset to its normal position. This time should be 3 to 5 seconds. If the time is in excess of this, check for binds between the piston and cylinder or for clogging of the orifice. If reset time is too short additional oil is needed.

OPERATING MECHANISM LINE-UP

Using the operating handle, operate the mechanism several times through its complete stroke and check that all of the cranks, links, cams and rollers are lined up and operate freely. This should be done with the operating springs blocked. The relationship of the various links, cranks, etc. of the mechanism have been set at the factory and no provision for adjustment has been made. If misalignment is present or the links are not completely free, examine the mechanism for worn or damaged parts.

OPERATING HANDLE OVERTRAVEL

With the operating springs connected slowly rotate the operating handle until the switch operates. Continue to rotate the handle until the handle socket (10), Fig. 1, reaches its stop, measuring the overtravel

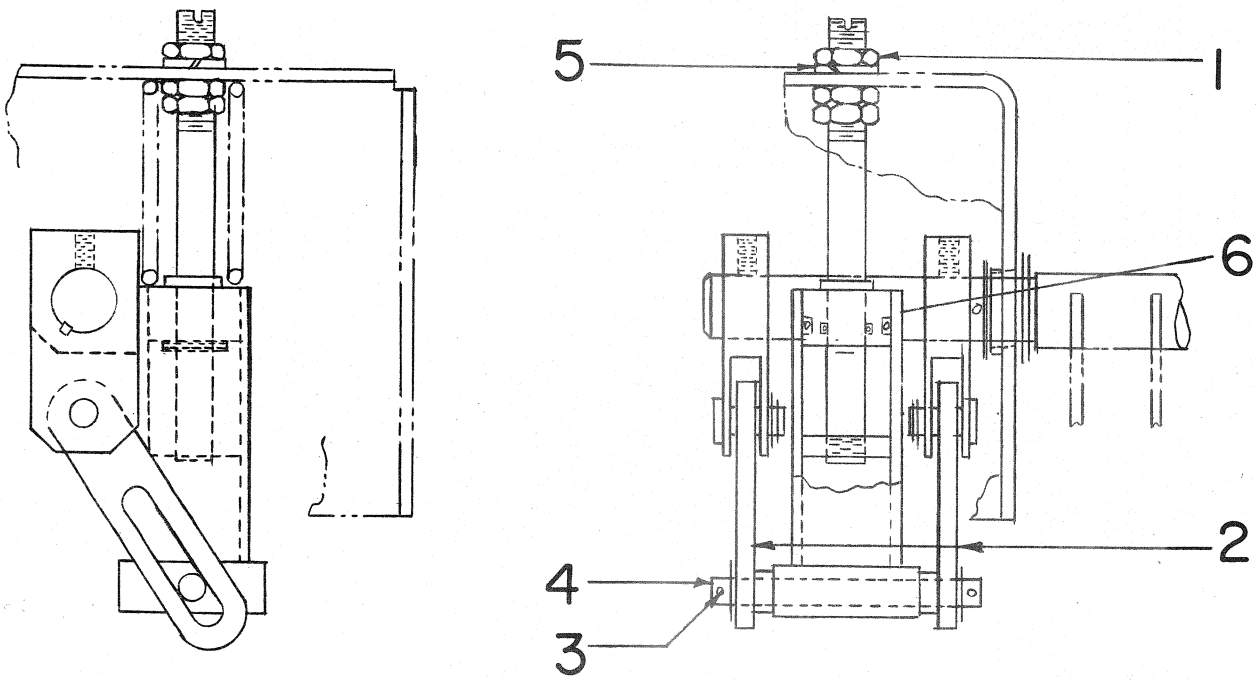
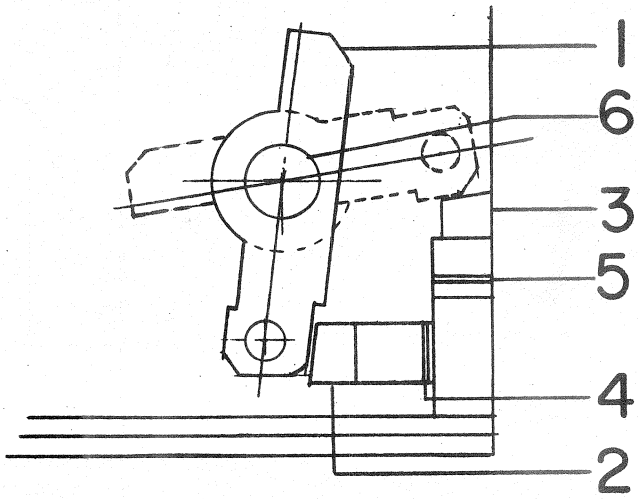


Fig. 15 (0107B9313)

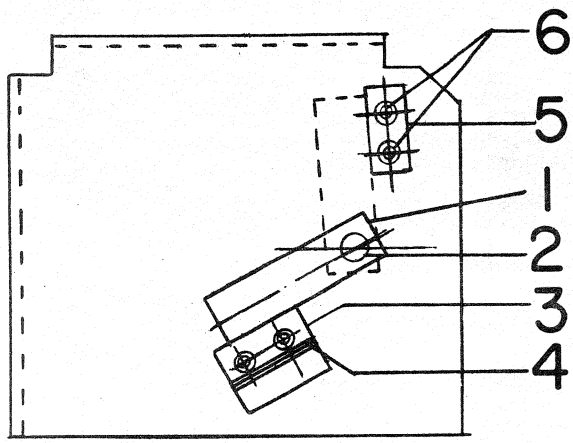
1. Nut
2. Links
3. Cotter Pin
4. Connecting Pin
5. Lock Washer
6. Screws

Fig. 15 Opening Dashpot



1. Middle Link
2. Closing Stop
3. Opening Stop
4. Closing Stop Shim
5. Opening Stop Shim
6. Center Shaft

Fig. 16 Stop Assembly



1. Crank Shaft Link Stop
2. Crank Shaft
3. Closing Stop
4. Closing Stop Shim
5. Opening Stop
6. Stop Bolts

Fig. 17 Stop Assembly

Fig. 16 & 17 (107B9375)

of the handle from the point where the switch operates. This distance should be a minimum of 1/2". Measure the overtravel for both the "open" and "close" directions of the handle.

The location of the stop block has been set and doweled into position at the factory. If insufficient overtravel is present, examine the mechanism linkage for damage or binds. If however the overtravel in one direction is less than the minimum, while in the other direction it is much greater, the overtravel can be balanced by removing the dowel pins and shifting the stop block in the proper direction. This adjustment can only be done when the complete mechanism assembly is removed from the housing. Refer to the section on MAINTENANCE for removal of the mechanism assembly.

PRIMARY CONTACT GAP

With the switch blade in the open position, the primary gap should be set at 2-3/4" + 1/2" - 1/4", measured between the arcing horn and the lower arc chute runner. To adjust this gap to the above dimensions, add or remove shims (5), Fig. 16. If this adjustment is made, place the switch blade in the open position and check to see that link (1), Fig. 17 hits stop (5), Fig. 17 at the same time or 1/32" before link (1), Fig. 16 hits stop (3), Fig. 16. If this association is not held, adjust stop (5), Fig. 17 by loosening bolts (6), Fig. 17.

FINAL INSPECTION

Before placing the SE-9 into service, a final inspection should be made consisting of the following:

1. Check all nuts, washers, bolts, cotter pins and terminal connections for tightness.
2. See that all bearing surfaces of the mechanism have been lubricated. Refer to the section on LUBRICATION.
3. Operate the device slowly several times by hand and note that there is no binding or excessive friction.
4. See that any place where the surface of the paint has been damaged during installation is repainted immediately.
5. Replace all barriers, covers and any other parts that may have been removed during installation.

HI-POTENTIAL TEST

If the device has been stored for a long period of time, it is recommended that the insulation be checked before it is placed in service. A standard 60 cycle high potential test at 14,000 volts RMS for the 4.8 kv switch and 27,000 volts RMS for the 13.2 kv switch will normally indicate whether the device is satisfactory for service. With the switch contacts in the fully opened position, apply the high potential to each terminal individually for one minute with all other terminals and the frame grounded. After high potential tests are made all organic insulating materials should be inspected for visible leakage current paths, and necessary action must be taken to replace insulation that may have been affected by moisture absorption. The high potential test is also recommended for devices which have been removed from service and stored over an extended period of time under unfavorable atmospheric conditions.

NOTE: Before applying a hi-potential test make certain that the switch has been disconnected from both the source and load.

MAINTENANCE

Dependable service and safe operation of the equipment is contingent upon operation of the switch and mechanism assembly. To maintain such service, it is recommended that a definite inspection and maintenance schedule be set up and followed, as serious shutdowns can often be avoided by locating potential sources of trouble in an early stage.

BEFORE ANY MAINTENANCE WORK IS PERFORMED ON THE SWITCH OR OPERATING MECHANISM MAKE CERTAIN THAT THE OPERATING SPRINGS HAVE BEEN BLOCKED. (See "To Block Springs").

INSPECTION

The frequency of the inspection and maintenance schedule is dependent upon the individual application and will differ on various installations. Operating experience gained after a short time will be of great

help in determining this schedule. The following instructions list the main points to be included in an inspection and a few general recommendations.

CONTACTS

With the switch in the open position the arcing tip should be examined carefully for smoothness. If rough spots are present due to arcing, they can be smoothed off by the use of a fine file and crocus cloth.

NOTE: Do not remove more metal from the tip than is necessary.

Also, examine the primary fingers and blades for burns or pits. If excessive burns are present the contacts should be replaced.

After completing inspection of the contact check all contact adjustments and clearances as listed under ADJUSTMENTS.

MECHANISM

A careful inspection should be made for loose nuts, bolts, cotter pins or broken retaining rings. All cams, rollers, links and bearings should be examined for evidence of excessive wear or damage. Lubricate the mechanism as listed under LUBRICATION and check the operation for binding or excessive friction.

INSULATION

The surface of the Self-X insulation should be kept clean and unmarred to prevent moisture absorption. Smoke or dust collected between inspection periods should be wiped off with a clean dry cloth and if dampness is apparent, heaters should be installed to insure dryness.

LUBRICATION

In order to maintain reliable operation it is important that the switch assembly be properly lubricated at all times. During assembly at the factory, all bearing surfaces, machined surfaces, and all other parts of the switch and mechanism subject to wear have been properly lubricated using the finest grade of lubricants available. However, even the finest oils and greases have a tendency to oxidize with age, as evidenced by hardening and darkening in color. Also frequent operation of the device causes the lubricant to be forced out from between the bearing surfaces. A simple lubrication will often clear up minor disturbances which might be mistaken for more serious trouble.

A definite lubrication schedule should be set up taking into consideration the frequency of operation of the switch and local conditions. Until such a schedule is worked out, it should be lubricated at each periodic inspection and also whenever overhauling or replacement of parts becomes necessary. It is also recommended that the device be operated at regular intervals to insure it is operating freely.

LINKAGE

All bearing surfaces of toggle linkage should be lubricated with G. E. lubricant D50H15.

CONTACT SURFACES

Apply a thin film of G. E. lubricant D50H47 to all silvered contact surfaces. Before applying new grease to the contacts, remove any old grease that may be present with a clean, dry cloth. A thin film of D50H47 should also be applied to the contact surfaces between the primary blade and hinge block and between the primary blade and auxiliary blade whenever disassembly is necessary.

NOTE: DO NOT APPLY LUBRICANT TO THE ARCING CONTACTS.

BOOSTER CYLINDER

Apply a thin film of D50H15 to the inner surface of the booster cylinder. Do not apply excessive grease as this tends to clog the nozzle.

NEEDLE BEARINGS

During periodic inspections apply a few drops of light machine oil SAE-20 or -30 to all needle bearings in the mechanism. Whenever it becomes necessary to replace parts or during a major overhaul it is recommended that the bearings be removed, thoroughly cleaned and repacked with D50H15. Care should be taken in removing and replacing the bearings so that the needles are not damaged. A petroleum solvent or similar cleaner should be used to remove all old grease. DO NOT USE CARBON-TETRACHLORIDE. If the grease is badly oxidized it may be necessary to use alcohol to remove it. After the bearings have been thoroughly cleaned, spin them in clean light machine oil to remove all cleaner or solvent. Allow the oil to drain and immediately repack with G. E. Lubricant D50H15 being sure all metal parts are greased.

SLEEVE BEARINGS

During periodic inspections apply a few drops of light machine oil SAE-20 or -30 to all sleeve bearings within the switch and mechanism. During a major overhaul or whenever it becomes necessary to replace parts, remove all pins and apply a thin film of D50H15 after first removing all old grease.

SINTERED DRY - TYPE BEARINGS

These bearings are designed with a lubricant impregnated into the sintered metal. No further lubrication is needed on this type during the life of the bearing.

REPLACEMENT OF PARTS

The following information covers the detailed assembly instruction for the removal of various parts of switch assembly in order to make necessary repairs or replacements. This section includes only those parts that during the life of the switch are most subject to damage or wear.

DO NOT WORK ON THE SWITCH OR OPERATING MECHANISM UNLESS THE OPERATING SPRINGS HAVE BEEN DISCONNECTED.

NOTE: Upon completion of any assembly work on the switch or mechanism, all adjustments and clearances must be checked as listed under ADJUSTMENTS.

BLADE ASSEMBLY

To remove the primary blade assembly, proceed as follows:

1. Open the switch.
2. Remove the assembly bolts (13), Fig. 18, from the operating rod.
3. Remove the cotter pins, nuts and spring washers from the hinge stud (8).
4. Remove hinge stud (8) allowing the complete blade assembly to be removed.

Reassemble in the reverse order checking that correct hinge pressure is obtained. Refer to the section on LUBRICATION before reassembly. Recheck all blade adjustments.

AUXILIARY BLADE ASSEMBLY

To remove the auxiliary blade assembly, proceed as follows:

1. Open the switch.
2. Remove pin (12), Fig. 18, and release main spring pressure.
3. Remove pin (11) connecting the piston to the primary blade.
4. Remove hinge pin (6) allowing the auxiliary blade to be removed.

The same method of disassembly should be followed when removing the auxiliary blade after first removing the complete blade assembly from the switch. Reassemble in the reverse order referring to the section on LUBRICATION. Recheck all adjustments pertaining to the auxiliary blade.

PISTON

To remove the piston, refer to Fig. 18, and proceed as follows:

1. Open the switch.
2. Remove pin (12) releasing the main spring pressure.
3. Remove pin (11) connecting the piston to the primary blade. The auxiliary blade can now be rotated relative to the primary blade toward a closed position.
4. Remove the two toggle springs (4).
5. Remove the trip roller (2) and slide the pin from the toggle link.

1. Contact Block
2. Trip Roller
3. Piston
4. Toggle Springs
5. Pin
6. Hinge Pin
7. Hinge Block
8. Hinge Stud
9. Rivets
10. Arc Chute Side Brace
11. Pin
12. Pin
13. Assembly Bolts

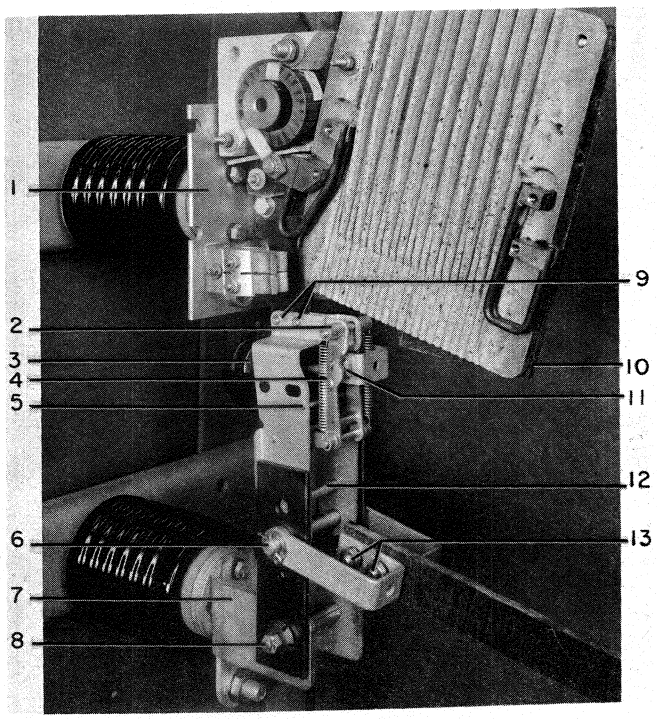


Fig. 18 (8027287)

Fig. 18 Cutaway View of SE-9 Switch

1. Dowel Pins
2. Assembly Bolts
3. Switch Crank Shaft
4. Operating Rod

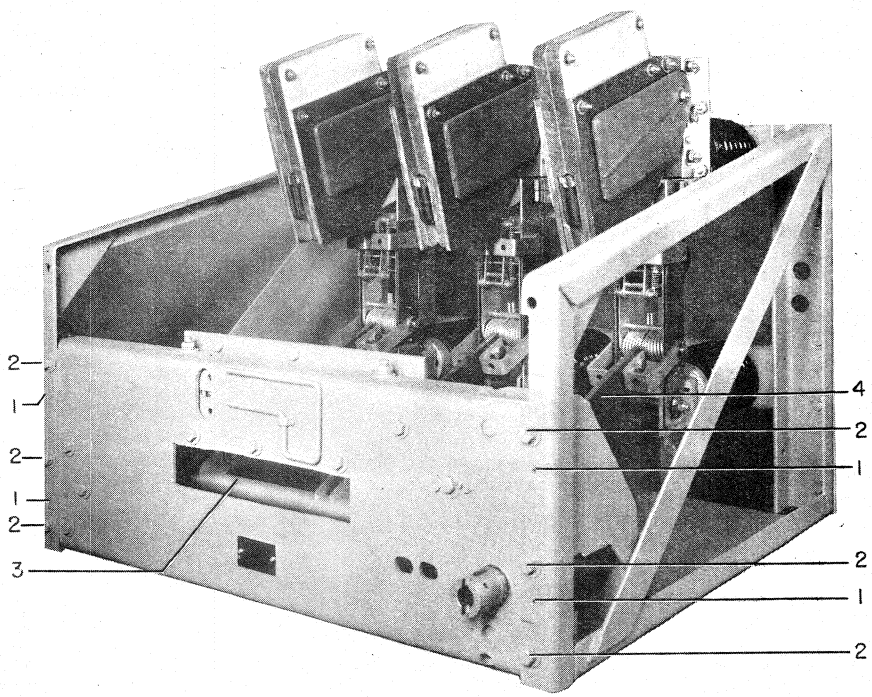
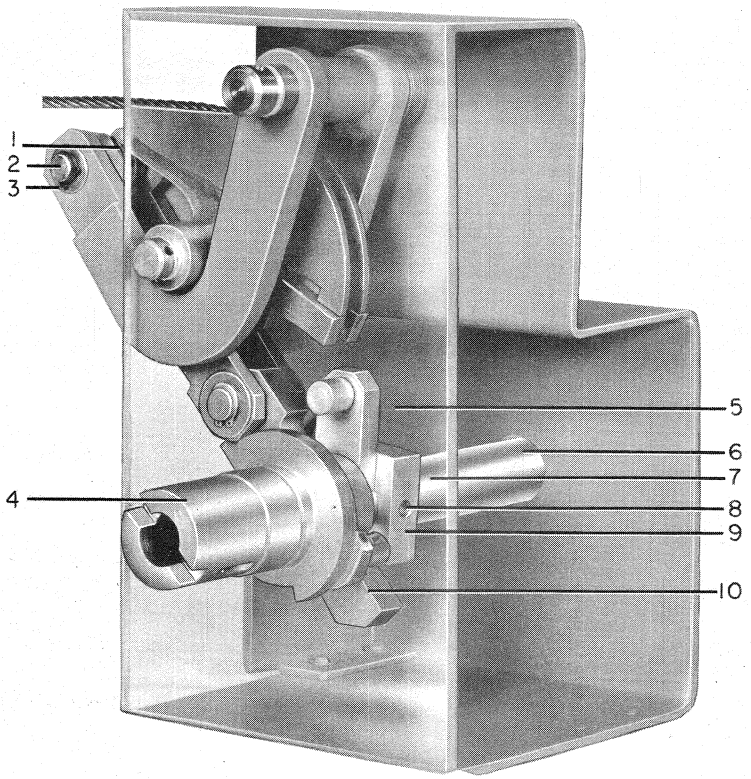


Fig. 19 (8027220)

Fig. 19 SE-9 Auto-Blast Interrupter Switch



1. Roller
2. Pin
3. Retaining Ring
4. Hub
5. Bevel Gear
6. Shaft
7. Bevel Gear
8. Groove Pin
9. Output Crank
10. Center Crank

Fig. 20 (8027398)

Fig. 20 Cutaway of SE-9 Operating Mechanism

6. Remove piston.

Reassemble in the reverse order placing a thin film of grease on the inner surface of the cylinder as stated under LUBRICATION. Check for proper air pressure as described under ADJUSTMENTS.

ARCING TIP

To remove the arcing tip from the auxiliary blade, refer to Fig. 18 and proceed as follows:

1. Remove the auxiliary blade assembly as previously described.
2. Remove the rivets (9) from the base of the arcing tip. With the rivets removed, the arcing tip can be removed.

A new arcing tip can be installed by re-riveting in place.

NOTE: When replacing the arcing tip, it should lean slightly towards the nozzle in the cylinder so that the nozzle is directed at the tip.

BOOSTER CYLINDER

To remove the booster cylinder, the auxiliary blade must first be removed as previously described. Grind or file off the riveted ends of pin (5), Fig. 18. Under this condition, the legs of the auxiliary blade can be spread for removal of the cylinder. Reassembly can be accomplished by replacement of pin (5) and re-riveting. When replacing the cylinder, apply a thin film of grease as stated under LUBRICATION.

ARC CHUTE ASSEMBLY

The arc chute (1), Fig. 14, can easily be removed from the switch by removing the mounting bolts (7). Further disassembly of the arc chute may be accomplished by removal of the various assembly bolts after removing the pole pieces.

When reassembling the arc chute, care should be taken to insure that the fins of the arc chute sides are equally spaced throughout their length. Care should also be taken when bolting the side brace (10), Fig. 11, in place that the trip latches are opposite each other to obtain proper tripping of the auxiliary blade. After remounting the arc chute, check all adjustments as outlined under ADJUSTMENTS.

INSULATORS

The insulators can easily be removed by first removing the arc chute and contact block assembly (1), Fig. 18 for the upper insulator or the hinge block (7), Fig. 18 and blade assembly for the lower insulator. Care should be taken when replacing the insulators that the blades and contacts are correctly aligned.

MECHANISM ASSEMBLY

The entire mechanism can be removed from the switch housing in the following manner by referring to Fig. 19.

1. Disconnect the operating rods (4) from the switch and crank shaft (3).
2. Remove the dowel pins (1).
3. Removal of assembly bolts (2) allows the assembly to be removed.

Reassemble in the reverse order making certain that the dowel pins correctly position the frame. Care should also be taken that the bearing in the operating rod operates freely after rebolting to the switch crank shaft.

CABLE CAM ROLLER

Referring to Fig. 20, removal of the roller (1) can be done as follows:

1. Disconnect the operating springs.
2. Rotate the handle socket (4) so that the linkage is in the position shown.
3. Remove retaining ring (3).
4. Pin (2) can now be removed from the linkage.

Reassemble in the reverse order making certain that the roller is operating freely. Refer to the section on LUBRICATION.

BEVEL GEARS

The bevel gears can only be removed from the mechanism after the complete mechanism assembly has been removed from the switch. Refer to Fig. 20 and proceed as follows:

1. Place the switch in the fully closed position.
2. Mark the shaft (6) and mechanism frame in any convenient location

(such as on the rear of the shaft) so that during reassembly, the shaft can be replaced in its original angular relationship with the other parts of the mechanism.

3. Remove groove pin (8), from the output crank.
4. Slide shaft (6) towards the rear of the frame until the key in the shaft is completely disengaged from the gear (7). If the shaft does not slide easily it may be tapped back by placing a 3/4" diameter rod through the handle socket (4). Care should however be taken not to damage the needle bearings within the handle socket or center crank.
5. Remove the key from the shaft.
6. The shaft can now be removed from the assembly allowing the center crank (10), output crank (9) and bevel gear (7) to drop free.

Reassemble in the reverse order making certain that the switch is fully closed and shaft (6) is in its original location as described under 2 above. Care should also be taken that the shaft operates freely and no binds are present in the needle bearings. Refer to the section on LUBRICATION and check the OPERATING MECHANISM LINE-UP and PRIMARY CONTACT WIPE as listed under ADJUSTMENTS.

To remove the bevel gear (5), Fig. 20, on the switch crank shaft, it is first necessary to remove the bevel gear (7) and shaft (6) as described above. In this condition the bevel gear (5) can be slid off the shaft towards the right.

When replacing this gear, care should be taken that the key does not damage the shouldered bearing in the frame.

RENEWAL PARTS

During the normal life of the switch, no renewal parts should be required. Under certain applications having abnormal operations, some parts may become worn and will require replacement. For these applications a stock of renewal parts is desirable as it will reduce maintenance shutdown time if worn or damaged parts must be replaced.

The following is a listing of all parts used in the SE-9 Interrupter Switch except standard hardware such as screws, nuts, washers, etc. that can be purchased locally. Also included is a list of those parts most subject to wear and recommended for normal maintenance.

ORDERING INSTRUCTIONS

When ordering renewal parts, address the nearest General Electric Sales Office, specifying the quantity required, description, catalog and reference numbers, as listed in this bulletin, and complete nameplate data as found on the switch.

Renewal parts which are furnished may not be identical to the original parts, since improvements are made from time to time. The parts which are furnished, however, will be interchangeable.

PARTS RECOMMENDED FOR NORMAL MAINTENANCE

CAT. NO.	QUANTITY PER SWITCH	DESCRIPTION
828C853 G-5	3	Primary Blade
121A7458 P-1	24	Contact Finger
634D318 G-5	3	Auxiliary Blade Assembly (Inc. Arc Horn and Cylinder)
634D317 G-1	3	Arc Chute Assembly
634D318 G-4	3	Piston Assembly

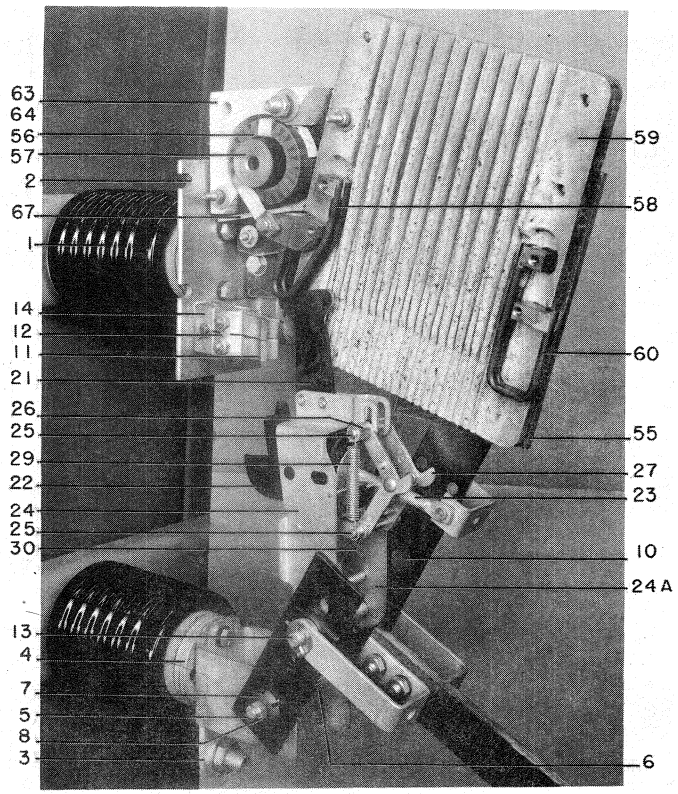


Fig. 21 (8027289)

Fig. 21

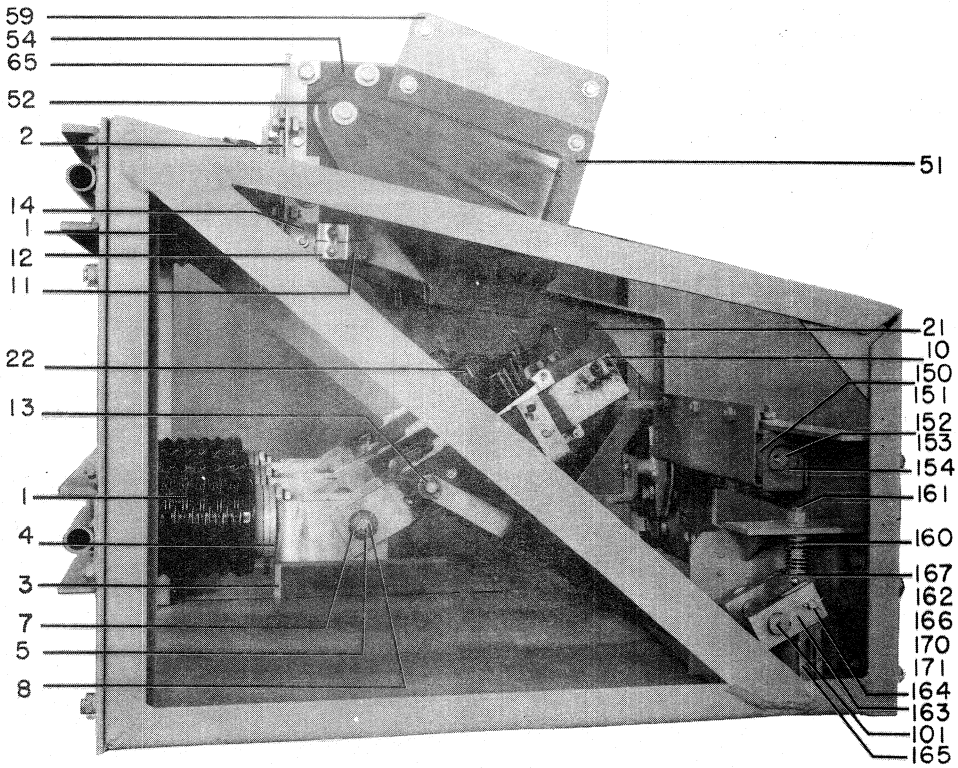


Fig. 22 (8027216)

Fig. 22

REF. NO.	2.4/4.8-0-1	7.2/13.2-0-1	QT. PER SW.	DESCRIPTION
1	281B779 G-1	281B721 G-1	6	Insulator
2	828C853 G-1	828C853 G-1	3	Contact Block (Terminal Below)
2	828C853 P-19	828C853 P-19	3	Contact Block (Terminal Above)
3	6411850 P-10	6411850 P-10	3	Hinge Block
4	263C927 P-30	263C927 P-30	12	Hinge Block Spacer
5	263C904 P-5	263C904 P-5	3	Hinge Stud
6	421A209 P-72	421A209 P-72	3	Spacer
7	2450821 P-1	2450821 P-1	6	Spring Washer
8	634D318 P-35	634D318 P-35	6	Castle Nut
9	634D318 G-6	634D318 G-6	3	Main Blade Assembly
10	828C853 G-5	828C853 G-5	3	Main Blade
11	121A7458 P-1	121A7458 P-1	24	Contact Finger
12	456A806 P-1	456A806 P-1	12	Contact Finger Spring
13	104A2425 P-4	6076405 P-55	3	Hinge Pin
14	828C853 P-11	828C853 P-11	3	Finger Support
15	828C860 G-2	828C860 G-8	3	Operating Rod
16	828C853 P-17	828C853 P-17	3	Buffer
20	634D318 G-5	634D318 G-5	3	Auxiliary Blade Assembly
21	263C907 P-24	263C907 P-24	3	Auxiliary Blade
22	281B707 P-2	281B707 P-2	3	Cylinder
23	634D318 G-4	634D318 G-4	3	Piston
24	263C902 P-1	263C902 P-1	3	Support (Left)
24A	263C902 P-2	263C902 P-2	3	Support (Right)
25	6227834 P-4	6227834 P-4	6	Pin
26	6227835 P-22	6227835 P-22	6	Roller
27	263C906 G-5	263C906 G-5	3	Toggle Link
28	263C906 P-17	263C906 P-17	3	Pin
29	6202632 P-1	6202632 P-1	6	Spring
30	421A208 P-10	421A208 P-10	6	Spacer
31	263C906 G-4	263C906 G-4	3	Guide Link
32	6227836 P-15	6227836 P-15	3	Pin
33	6202639 P-1	6202639 P-1	3	Spring for Guide Link
34	421A208 P-11	421A208 P-11	6	Spacer
35	6227834 P-3	6227834 P-3	3	Spring Pin
36	6202633 P-1	6202633 P-1	3	Main Spring (Left Hand)
37	6202634 P-1	6202634 P-1	3	Main Spring (Right Hand)
38	456A876 P-106	456A876 P-106	3	Bushing
39	121A7425 P-1	121A7425 P-1	3	Spring
50	634D317 G-1	634D317 G-1	3	Arc Chute Assembly
51	619C431 P-10	619C431 P-10	3	Insulating Plate
52	619C431 G-1	619C431 G-1	3	Pole Piece (Left)
53	619C431 G-2	619C431 G-2	3	Pole Piece (Right)
54	828C852 P-1	828C852 P-1	3	Mounting Plate
55	828C853 P-2	828C853 P-2	3	Mounting Plate
56	898B234 G-1	898B234 G-1	3	Coil
57	619C432 G-3	619C432 G-3	3	Core
58	898B235 G-1	898B235 G-1	3	Rear Arc Runner
59	619C409 P-1	619C409 P-1	6	Arc Chute
60	898B235 G-2	898B235 G-2	3	Front Arc Runner
61	828C852 P-5	828C852 P-5	3	Guide (Left)
62	828C852 P-6	828C852 P-6	3	Guide (Right)
63	898B283 P-1	898B283 P-1	3	Brace (Left)
64	898B283 P-2	898B283 P-2	3	Brace (Right)
65	828C853 P-1	828C853 P-1	3	Support (Left)
66	828C853 P-2	828C853 P-2	3	Support (Right)
67	898B283 P-3	898B283 P-3	3	Stop

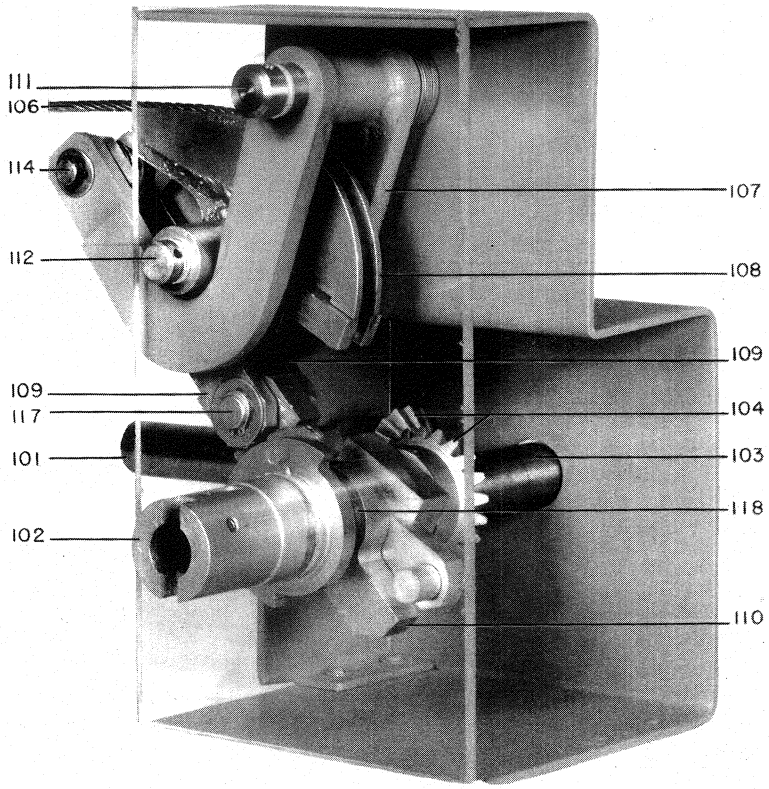


Fig. 23 (8027403)

Fig. 23

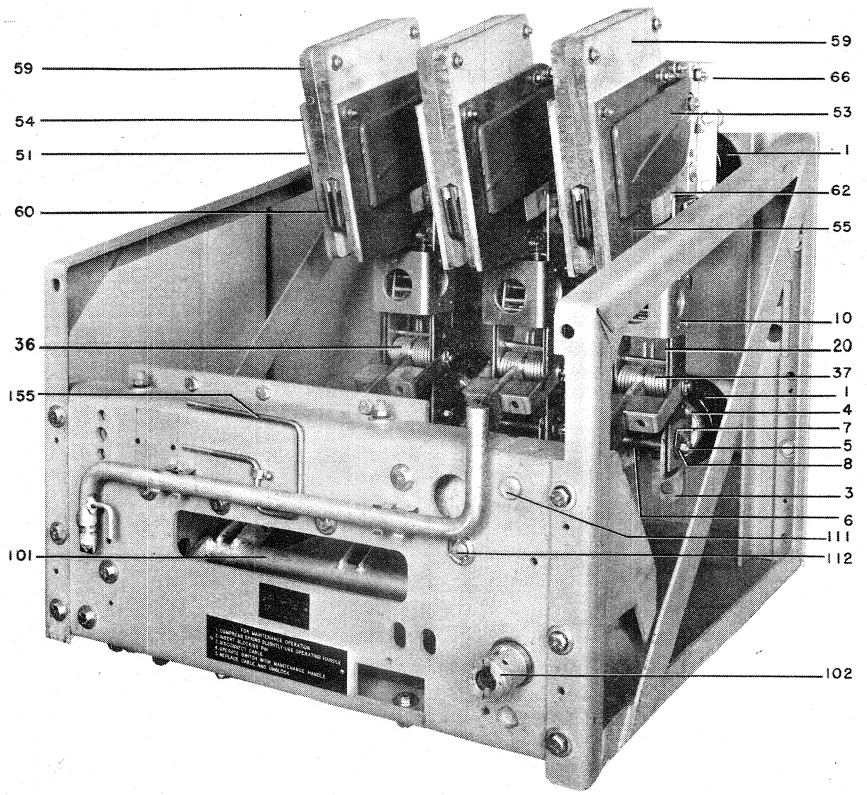


Fig. 24 (8028081)

Fig. 24

REF. NO.	2.4/4.8-0-1	7.2/13.2-0-1	QT. PER SW.	DESCRIPTION
100	634D306 G-1	634D306 G-2	1	Mechanism Assembly
101	958C663 G-1	958C663 G-2	1	Crank Shaft
102	634D306 G-51	634D306 G-51	1	Hub (Includes Q-2 of P-119)
103	634D306 G-50	634D306 G-50	1	Shaft & Gear Coupler Assembly
104	898B236 P-1	898B236 P-1	2	Gear
105	828C818 G-1	828C818	1	Stop Block
106	456A383 P-1	456A383 P-1	1	Wire Rope
107	828C805 G-1	828C805 G-1	1	Link
108	898B242 G-1	898B242 G-1	1	Crank
109	634D306 G-53	634D306 G-53	1	Link Assembly (Incl. P-115)(Front)
109A	634D306 G-54	634D306 G-54	1	Link Assembly (Incl. P-115)(Rear)
110	634D306 G-52	634D306 G-52	1	Link Assembly (incl. P-116 & 131)
111	828C805 P-10	828C805 P-10	1	Shaft
112	828C805 P-9	828C805 P-9	1	Shaft
113	414A112 P-29	414A112 P-29	1	Bearing
114	828C805 P-5	828C805 P-5	1	Shaft
115	456A885 P-10	456A885 P-10	2	Bushing
116	456A885 P-9	456A885 P-9	1	Bushing
117	828C805 P-4	828C805 P-4	1	Shaft
118	456A885 P-11	456A885 P-11	1	Bushing
119	414A112 P-4	414A112 P-4	2	Bearing
120	414A105 P-34	414A105 P-34	1	Washer
121	828C818 P-5	828C818 P-5	1	Buffer
122	828C818 P-7	828C818 P-7	1	Buffer
123	456A876 P-120	456A876 P-120	2	Spacer
124	456A885 P-6	456A885 P-6	2	Bushing
125	456A885 P-13	456A885 P-13	1	Bushing
126	414A112 P-32	414A112 P-32	1	Thrust Race
127	898B242 P-4	898B242 P-4	1	Clip
128	456A876 P-121	456A876 P-121	1	Pipe Spacer
129	456A885 P-8	456A885 P-8	2	Bushing
130	828C845 P-12	828C845 P-12	1	Pipe Spacer
131	414A112 P-33	414A112 P-33	1	Bearing
132	828C807 P-12	828C807 P-12	1	Buffer
133	828C807 P-15	828C807 P-15	1	Buffer
134	414A105 P-36	414A105 P-36	1	Washer
135	828C818 P-9	828C818 P-9	*	Shim
136	828C807 P-14	828C807 P-14	*	Shim
150	137A6024	137A6024	1	Spring (Outer)
151	137A6023	137A6023	1	Spring (Inner)
152	828C808 P-5	828C808 P-5	1	Nut
153	828C808 P-3	828C808 P-3	1	Retainer
154	828C808 P-4	828C808 P-4	1	Disc
155	828C808 P-6	828C808 P-6	1	Spring Blocking Pin
160	121A7433 P-4	121A7433 P-4	1	Spring
161	828C875 P-4	828C875 P-4	1	Shaft
162	828C875 P-3	828C875 P-3	1	Plug
163	828C875 P-6	828C875 P-6	2	Clevis
164	828C875 P-9	828C875 P-9	2	Pin
165	828C875 P-7	828C875 P-7	2	Link
166	828C875 P-5	828C875 P-5	1	Piston
167	828C875 G-1	828C875 G-1	1	Cylinder
168	828C875 P-8	828C875 P-8	1	Pin
169	456A876 P-109	456A876 P-109	2	Spacer
170	121A5998 P-3	121A5998 P-3	1	"O" Ring
171	121A5998 P-2	121A5998 P-2	1	"O" Ring
172	456A876 P-128	456A876 P-128	1	Spacer

* AS REQUIRED

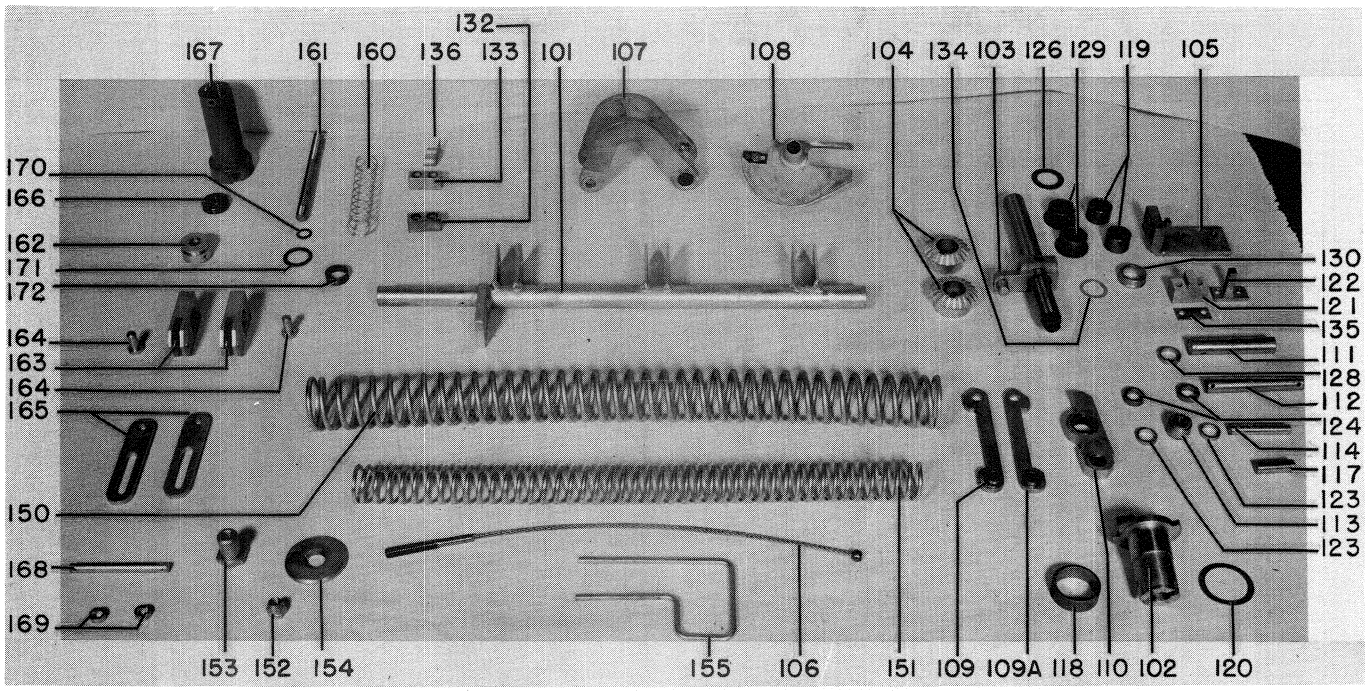


Fig. 25

Fig. 25 (8028106)

GENERAL ELECTRIC SALES OFFICES

READY TO ASSIST YOU . . . When You Have Electrical Problems . . . Need Further Information . . . Require Ordering Instructions

SALES OFFICE CODE KEY

- * **Industrial Equipment (including Agent and Distributor) Sales**
- † **Electric Utility Equipment Sales**
- § **Marine and Defense Equipment Sales**
- ‡ **Component Sales Operation**

ALABAMA
- * † Birmingham 5 . . . . . 2151 Highland Ave.
- * § Mobile 13 . . . . . 704 Government St.

ARIZONA
- * † ‡ Phoenix 12 . . . . . 3550 N. Central Ave.
- * † Tucson . . . . . 151 S. Tucson Blvd.

ARKANSAS
- * North Little Rock . . . . . 1900 E. Washington
- † Pine Bluff . . . . . P. O. Box 1033

CALIFORNIA
- * Fresno 21 . . . . . 321 Patterson Bldg.
- * † Los Angeles 54 . . . . . 212 N. Vignes St.
- ‡ § Los Angeles 5 . . . . . 3325 Wilshire Blvd.
- * Oakland 12 . . . . . 409 Thirteenth St.
- * † Sacramento 16 . . . . . 2407 "J" St.
- † San Bernardino . 337 N. Riverside Ave., Rialto, Cal.
- * † § San Diego 3 . . . . . 1240 7th Ave.
- * † ‡ § San Francisco 6 . . . . . 235 Montgomery St.
- * San Jose . . . . . 2155 So. First St.

COLORADO
- * † ‡ § Denver 6 . . . . . 201 University Blvd.

CONNECTICUT
- * † ‡ Hartford 5 . . . . . 764 Asylum Ave.
- * † New Haven 6 . . . . . 129 Church St.

DISTRICT OF COLUMBIA
- * † § Washington 5 . . . . . 777—14th St., N.W.
- § Washington 5 . . . . . 806—15th St., N.W.

FLORIDA
- * † Jacksonville 6 . . . . . 1901 Hill St.
- * † Miami 32 . . . . . 25 S.E. Second Ave.
- § Miami 66 . . . . . 5353 N.W. 36th St.
- † Pensacola . . . . . 207 S. Baylen St.
- * † ‡ Tampa 1 . . . . . Henderson Blvd. at Lois Ave.
- ‡ Tampa 6 . . . . . 1206 N. "A" St.

GEORGIA
- * † ‡ Atlanta 9 . . . . . 1860 Peachtree Rd., N.W.
- * Macon . . . . . 682 Cherry St.
- * † Savannah . . . . . 40 East Bay St.

IDAHO
- * † Boise . . . . . 1524 Idaho St.

ILLINOIS
- * † ‡ § Chicago 80 . . . . . 840 S. Canal St.
- * † Peoria 2 . . . . . 2008 N.E. Perry Ave.
- * Rockford . . . . . 4223 East State St.
- † Springfield . . . . . 607 E. Adams St.

INDIANA
- * † ‡ Evansville 5 . . . . . 2709 Washington Ave.
- * † ‡ Fort Wayne 6 . . . . . 1635 Broadway
- * † ‡ Indianapolis 8 . . . . . 3750 N. Meridian St.
- * ‡ South Bend 1 . . . . . 610 N. Michigan St.

IOWA
- * † Cedar Rapids . . . . . 210 Second St., S.E.
- * † ‡ Davenport . . 1039 State St., Bettendorf, Iowa
- * † Des Moines 12 . . . . . 2116 W. Grand Ave.

KANSAS
- * † Wichita 2 . . . . . 200 E. First St.

KENTUCKY
- * † Lexington . . . . . 628 E. Main St.
- * † ‡ Louisville 18 . . . . . 2300 Meadow Dr.

LOUISIANA
- † Alexandria . . . . . 720 Murray St.
- * Baton Rouge 6 . . . . . 3170 Florida Blvd.
- * Lake Charles . . . . . 422 Seventh St.
- * † ‡ § New Orleans 12 . . . . . 837 Gravier St.
- * † Shreveport . . . . . 206 Beck Bldg.
- * West Monroe . . . . . 701 N. Seventh St.

MAINE
- † Augusta . . . . . 152 State St.
- * Bangor . . . . . 77 Central St.

MARYLAND
- * † ‡ Baltimore 1 . . . . . 111 Park Ave.
- † Hagerstown . . . . . 1095 Jefferson Blvd.

MASSACHUSETTS
- * † ‡ § Boston 16 . . . . . 31 St. James Ave.
- * † Springfield 5 . . . . . 120 Maple St.
- * Worcester 5 . . . . . 288 Grove St.

MICHIGAN
- * † ‡ Detroit 2 . . . . . 700 Antoinette St.
- * Flint 2 . . . . . 653 S. Saginaw St.
- * ‡ Grand Rapids 8 . . . . . 2821 Madison Ave., S.E.
- * † Jackson . . . . . 210 W. Franklin St.
- * Kalamazoo . . . . . 927 S. Burdick St.
- * † Lansing 8 . . . . . 814 Michigan National Tower
- * Saginaw . . . . . Second National Bank Bldg.

MINNESOTA
- * † Duluth 2 . . . . . 14 W. Superior St.
- † Fergus Falls . . . . . Norby Bldg., Room 4
- * † ‡ Minneapolis 3 . . . . . 12 S. Sixth St.

MISSISSIPPI
- † Gulfport . . . . . 207 Jo-Fran Bldg.
- * † Jackson 1 . . . . . 203 W. Capitol St.

MISSOURI
- * † Joplin . . . . . 220½ W. Fourth St.
- * † ‡ Kansas City 5 . . . . . 106 W. Fourteenth St.
- * † ‡ St. Louis 1 . . . . . 818 Olive St.

MONTANA
- * Billings . . . . . 303 N. Broadway
- * † Butte . . . . . 103 N. Wyoming St.

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NEVADA
- † Las Vegas . . . . . 1711 S. 8th St.

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- † Manchester . . . . . 1662 Elm St.

NEW JERSEY
- * † ‡ Newark 2 . . . . . 520 Broad St.

NEW MEXICO
- * † Albuquerque . . . . . 120 Madeira Drive, N.E.

NEW YORK
- * † § Albany 3 . . . . . 8 Colvin Ave.
- † Binghamton . . . . . 19 Chenango St.
- * † ‡ Buffalo 2 . . . . . 625 Delaware Ave.
- ‡ Elmira . . . . . Main and Woodland Ave.
- * † § New York 22 . . . . . 570 Lexington Ave.
- * Niagara Falls . . . . . 44 Falls St.
- * † ‡ Rochester 4 . . . . . 89 E. Ave.
- * † ‡ Syracuse 6 . . . . . 3532 James St.
- * Utica 2 . . . . . 509 Kent St.

NORTH CAROLINA
- * † Charlotte 1 . . . . . 129 W. Trade St.
- * Greensboro . . . . . 801 Summit Ave.
- * † Raleigh . . . . . 16 W. Martin St.

NORTH DAKOTA
- † Bismarck . . . . . 418 Rosser Ave.

OHIO
- * † Akron 3 . . . . . 665 W. Market St.
- * † Canton 4 . . . . . 1226 Market Ave., N.
- * † ‡ Cincinnati 6 . . . . . 2621 Victory Pkwy.
- * † ‡ § Cleveland 4 . . . . . 4966 Woodland Ave.
- * † ‡ Columbus 15 . . . . . 395 E. Broad St.
- * † ‡ Dayton 2 . . . . . 11 W. Monument Bldg.
- § Dayton . . . . . 118 W. First St.
- ‡ Mansfield . . . . . 137 Park Ave., West
- * † ‡ Toledo 4 . . . . . 420 Madison Ave.
- * Youngstown 7 . . . . . 272 E. Indianola Ave.

OKLAHOMA
- * † Oklahoma City 2 . . . . . 119 N. Robinson St.
- * † Tulsa 4 . . . . . Columbia Bldg., 2651 E. 21st St.

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- * † Eugene . . . . . 1170 Pearl St.
- † Medford . . . . . 107 E. Main St.
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- * Kingsport . . . . . 322 Commerce St.
- * † Knoxville 16 . . . . . 1301 Hannah Ave., N.W.
- * † Memphis 4 . . . . . 1420 Union Ave.
- * † ‡ Nashville 3 . . . . . 1717 W. End Ave.
- § Oak Ridge . . . . . 253 Main St., East

TEXAS
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- * † Amarillo . . . . . 303 Polk St.
- * † Beaumont . . . . . 1385 Calder Ave.
- † Corpus Christi . . . . . 205 N. Chaparral
- * † ‡ Dallas 7 . . . . . 8101 Stemmons Freeway
- * † El Paso . . . . . 215 N. Stanton St.
- † Fort Worth 2 . . . . . 408 W. Seventh St.
- * † ‡ Houston 27 . . . . . 4219 Richmond Ave.
- * Lubbock . . . . . 3302 Avenue "A"
- * Midland . . . . . 704 S. Johnson St.
- * † San Antonio 5 . . . . . 434 S. Main Ave.

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- † Rutland . . . . . 38½ Center St.

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- * † Richmond 17 . . . . . 5001 W. Broad St.
- * † Roanoke 16 . . . . . 920 S. Jefferson St.

WASHINGTON
- † Pasco . . . . . 824 W. Lewis St.
- * † ‡ Seattle 4 . . . . . 710 Second Ave.
- § Seattle 4 . . . . . 550 W. Idaho St.
- * † Spokane 4 . . . . . S. 162 Post St.

WEST VIRGINIA
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- * Charleston 28 . . . . . 306 MacCorkle Ave., S.E.
- * † Fairmont . . . . . 310 Jacobs Bldg.
- * Wheeling . . . . . 40 Fourteenth St.

WISCONSIN
- * † § Appleton . . . . . 510 W. College Ave.
- † Madison 5 . . . . . 5317 Old Middleton Rd.
- * † ‡ Milwaukee 3 . . . . . 940 W. St. Paul Ave.

CANADA: Canadian General Electric Company, Ltd., Toronto

HAWAII: American Factors, Ltd., P.O. Box 3230, Honolulu 1

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WHEN YOU NEED SERVICE . . . These G-E service shops will repair, recondition, and rebuild your electric apparatus. The facilities are available day and night, seven days a week, for work in the shops or on your premises. Latest factory methods and genuine G-E renewal parts are used to maintain peak performance of your equipment. For full information about these services, contact your nearest service shop or sales office.

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- Oakland . . . . . 3400 Wood St.
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- San Francisco 3 . . . . . 1098 Harrison St.

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- Youngstown 7 . . . . . 272 E. Indianola Ave.

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- Johnstown . . . . . 841 Oak St.
- Philadelphia 24 . . . . . 1040 E. Erie Ave.
- (Pittsburgh) Homestead . . . . . Box 308, RD 1, Buttermilk Hollow Rd.
- York . . . . . 54 N. Harrison St.

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- Corpus Christi . . . . . 115 Waco St.
- Dallas 35 . . . . . 3202 Manor Way
- Houston 20 . . . . . 5534 Harvey Wilson Drive
- Midland . . . . . 704 S. Johnston St.

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- Roanoke . . . . . P.O. Box 1327
- 115 Albermarle Ave., S.E.

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- *Seattle 8 . . . . . 220 Dawson St.
- Spokane 3 . . . . . South 155 Sherman St.

WEST VIRGINIA
- Charleston 28 . . . . . 306 MacCorkle Ave.

WISCONSIN
- Appleton . . . . . Midway Industrial Area
- P.O. Box 83 County Trunk P
- Milwaukee 3 . . . . . 940 W. St. Paul Ave.

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